J. H. VAN DEVENTER
President and Editorial Director
C. S. BAUR
Vice-President & General Manager
H. E. LEONARD
Assistant General Manager
B. H. HAYES
Advertising Manager
O. L. JOHNSON, Manager
Reader Service and Market Research
R. E. BAUR, Production Manager
R. E. CLEARY, Technical Research and Promotion Manager

o o o

Executive Offices
Chestnut and 56th Sts.
Philadelphia 39, Pa., U.S.A.

Editorial and Advertising Offices
100 East 42nd St., New York 17, N.Y., U.S.A.

o o o

Regional Business Managers
C. H. OBER, New York 17, 100 East 42nd St.
H. E. LEONARD, New York 17, 100 East 42nd St.
ROBERT F. BLAIR, Cleveland 14, 1016 Guardian Bldg.
R. M. GIBBS, Pittsburgh 22, 428 Park Bldg.
B. L. HERMAN, Philadelphia 39, Chilton Bldg.
H. K. HOTTENSTEIN, Chicago 3, 1134 Otis Bldg.
PEIRCE LEWIS, Detroit 2, 7310 Woodward Ave.
D. C. WARREN, Hartford 1, Conn., P. O. Box 81
R. RAYMOND KAY, Los Angeles 28, 2420 Cheremoya Ave.

o o o

Owned and Published by
CHILTON COMPANY
(Incorporated)

OFFICERS AND DIRECTORS
C. A. MUSSELMAN, *Chairman*
JOS. S. HILDRETH, *President*
GEORGE H. GRIFFITHS, Vice-President
EVERIT B. TERHUNE, Vice-President
J. H. VAN DEVENTER, Vice-President
C. S. BAUR, Vice-President
P. M. FAHRENDORF, Vice-President
JULIAN CHASE, Vice-President
WILLIAM A. BARBER, Treasurer
JOHN BLAIR MOFFETT, Secretary
G. C. BUZBY, HARRY V. DUFFY
THOMAS L. KANE, CHARLES J. HEALE

o o o

WILLIAM H. VALLAR, Asst. Treas.

o o o

Chilton Editorial Board
PAUL WOOTON
Washington Representative

o o o

Member, Audit Bureau of Circulation

Member, Associated Business Papers

o o o

Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 per year. Single Copy, 35 cents. Annual Review Number $2.00.

o o o

Cable Address, "Ironage" N. Y.

o o o

Copyright, 1945, by Chilton Company (Inc.)

This Week in The
IRON AGE

Vol. 156, No. 22 November 29, 1945

Editorial

How to Avoid a Headache 41

o o o

Technical Articles

Estimating Die Costs 44
Handy Gaging Tool 48
Welded Ship Failures Traced 49
Continuous Gaging With X Ray Micrometer 50
High Tensile Steel Castings 52
Preventing Surface Decarburization in Transmission Gears 56
Cushioned High-Cobalt Shaper Tools 61
Sinters Economize Blast Furnace Operation 62
Rapid Ore Testing 63
New Bearing Alloy Conserves Tin 64
Magnetic Method for Diamond Hardness Measurements .. 65
New Equipment 66

o o o

Features

News Front 43
Assembly Line 70
Washington 74
West Coast 78
European Letter 82
Personals and Obituaries 86
Dear Editor 90
This Industrial Week 92
News of Industry 95

o o o

News and Markets

OPA Denies Steel Price Increase 95
Steel Price Chronology 95
Moisture Proof Covering 101
Russia Steel Expansion 107
Machine Tool Developments 108
Nonferrous Market News and Prices 110-11
Iron and Steel Scrap News and Prices 112-13
Comparison of Prices by Week and Year 114
Finished and Semifinished Steel Prices 116
Alloy Steel Prices 117
Fabricated Steel Products Prices 118
Warehouse Steel and Pig Iron Prices 119
Ferroalloy Prices 120
Mineral Assets Outlook 135
Describes Ore Pilot Plant 138

o o o

Index to Advertisers 197-98

Statement of Position—

Until the present tight steel situation is eased, there will be an unbalanced condition in all steel stocks.

There are three principal reasons for this:

1. Labor and coal shortages are currently lowering steel production.
2. Every industry is anxious to get on with reconversion and peacetime production.
3. There is a tremendous backlog of maintenance and repair requirements.

Ryerson stocks, largest in the nation, reflect current conditions. And because of the great load, it is not always possible to supply the desired steel or deliver available steel as quickly as usual. But we are doing everything we can to satisfy every customer's requirements.

When a certain kind or size of steel is not immediately available, every effort is made to suggest satisfactory alternates which buyers may use with confidence.

Ryerson's 103 years of experience in maintaining large and complete stocks and working closely with all industries, makes the recommendations of Ryerson metallurgists and engineers particularly practical and helpful.

We thank our customers for their courtesy and patience, for the confidence they have placed in our judgment when alternates for wanted steels have had to be offered, and for understanding our position.

Ryerson will continue to serve you to the best of its ability from its eleven strategically located plants. Stocks will be brought to normal as quickly as possible. This means that Ryerson will be among the first to have more complete stocks of present scarce steels—that Ryerson will continue to be the largest stock source for steel in the country.

Everett D. Graff
President
JOSEPH T. RYERSON & SON, INC.

RYERSON STEEL

Steel-Service Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston

The IRON AGE

ESTABLISHED 1855

o o o

November 29, 1945

o o o

J. H. VAN DEVENTER
President and Editorial Director

C. S. BAUR
Vice-President and General Manager

o o o

Editorial Staff

Editor ..... T. W. LIPPERT
News Markets Editor T. C. CAMPBELL
Machine Tool Editor... H. E. LINSLEY

o o o

Associate Editors

F. J. WINTERS
J. ALBIN
JOHN ANTHONY
S. H. BARMASEL
E. S. KOPECKI

Editorial Assistants

M M. SCHIEN
H. W. VAN CAMP
C. R. MUNZER
J. P. O'CONNOR
E. L. SCHIMKO
E A. TOWNE
A. J. SPEAR

Foreign Editors

Europe ..... Jack R. Hight
Canada (Contrib.)..... F. Sanderson

Regional News and Technical Editors

T. E. LLOYD
Pittsburgh 22
428 Park Bldg.

C. T. POST
Chicago 3
1134 Otis Bldg.

L. W. MOFFETT
EUGENE HARDY
D. J. ANSBORO
Washington 4
National Press Bldg.

W. A. LLOYD
Cleveland 14
1016 Guardian Bldg.

S. H. BRAMS
Detroit 2
7310 Woodward Ave.

OSGOOD MURDOCK
WORTH HALE
San Francisco 3
1355 Market St.

Editorial Correspondents

ROBERT McINTOSH
Cincinnati

L. C. DEAN
Buffalo

G. FRAZAR
Boston

HUGH SHARP
Milwaukee

R. RAYMOND KAY
Los Angeles

JOHN C. McCUNE
Birmingham

ROY EDMONDS
St. Louis

JAMES DOUGLAS
Seattle

How to Avoid a Headache

THE world cannot consume more than it produces; therefore consumption is determined by productivity. The ability to consume, which is the ability to have and to use, is therefore measured by what we produce.

It follows from this that the material wealth of the world, or of a nation that is a fraction of it, can only be increased by increasing the collective productivity. But collective productivity is simply individual productivity integrated. It is the sum of what all of the Tom's, Dick's, Harry's and Mary's put into each hour.

The big question today is what Tom, Dick, Harry and Mary should get out of it.

The trouble is that sometimes you cannot measure individual productivity and another trouble is that many individuals necessary to an economy are what we call "nonproductive."

Public, professional and personal service occupations, for example, have no calibration in terms of productivity, although their scope and activity are usually almost directly proportional to it. In distribution, which is an essential part of the economy, certain activities, such as selling, are not only productive but measurable, whereas others are not.

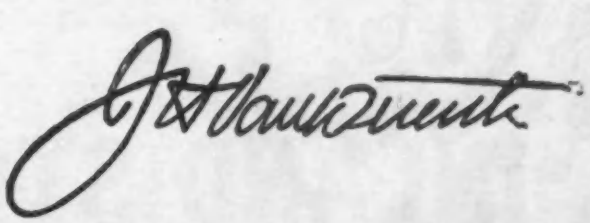
Investment, by stockholders and entrepreneurs, is sometimes highly productive, and sometimes not at all but it cannot be currently measured by results, since these come perhaps years after the risk is incurred.

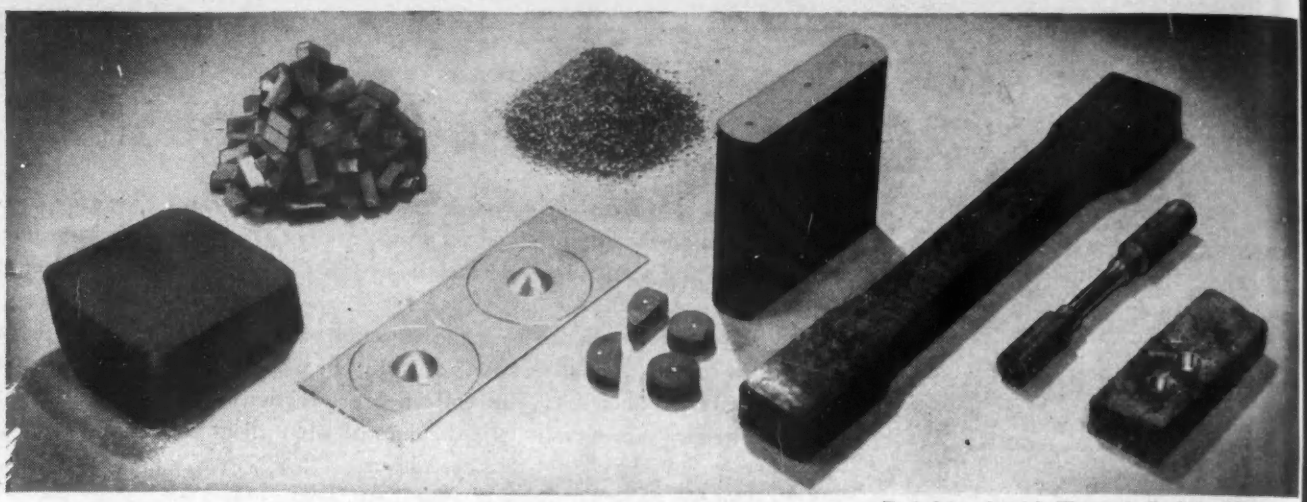
We hear a good deal today about labor's proper share of increased productivity and indeed labor has a right to its share. But usually a rather small part of labor actually has a hand in making the gains. Most of them are made through the efforts of management which includes the engineering talent.

In a well managed and well mechanized plant which I visited a few days ago, an operator was producing three times as many identical parts per hour as he did four years ago. The cause of the increased productivity was entirely outside of the operator, indeed his type of mind was such that so far as he was concerned, without the equipment given him to work with, he would be producing the previous output as long as he worked at the job. To give him credit, at least let us say he was doing his best but that best was made better by management's ability to improve conditions.

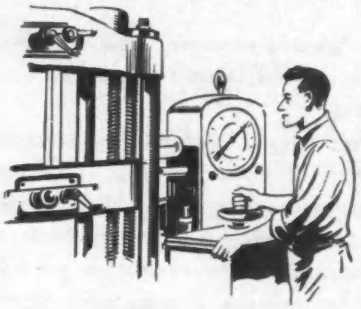
Of course, one cannot say that such labor should not share in the fruits of increased productivity. It should and does. Increased productivity, or wealth increments as some call them, must be shared by all. That is why we have now and have had, in our country, a better standard of wages and of living than that of any other country.

One thing you cannot do and stay solvent and that is to pass out the fruits of enterprise faster than you pick them. That is a cold hard fact that is not liked or appreciated by many persons today who should know better. A realistic approach to this problem would save us a good many of today's headaches.

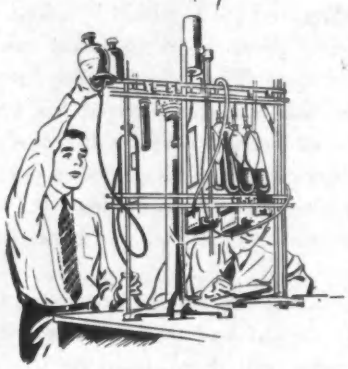




Typical Samples of the Thousands Checked to Maintain Quality and Uniformity in Inland Steels



Hundreds of Tons of Samples are Tested Yearly



Making steel, the basic material of our modern world, is no simple process — nor is it one of small responsibility. For in making steel thousands of requirements must be satisfied, many involving consideration for human life as well as the reputation of designers, fabricators and builders of equipment. Operations of such consequence call for constant checks and rigid testing — ruling out all guesswork.

In the course of a single year hundreds of tons of steel samples undergo chemical, tensile, metallographic, etch and other tests at Inland. Chemical analyses alone run well over a thousand tons. These precautions are taken to furnish a uniformity and quality in steel that will fully measure up to every requirement.

For the benefit of steel users, Inland maintains a large specialized staff of engineers and metallurgists who will gladly cooperate with you in the selection and use of steels — without obligation.

Inland Steel Company, 38 S. Dearborn St., Chicago 3, Ill. Sales Offices: Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul. Principal Products: Bars • Structurals • Plates • Sheets • Strip • Tin Plate • Floor Plate • Piling • Reinforcing Bars • Rails • Track Accessories.

INLAND STEEL COMPANY

The IRON AGE
Dec. 27, 1945

NEWSFRONT

► OPA denial of a steel price increase came as a shock to the steel industry which asked for an overall $7 a ton rise, particularly because of unofficial assurances of some grant by members of the agency.

► Freight rates on steel from the Pittsburgh-Youngstown-Cleveland districts to eastern ports for water shipment to the West Coast will be considered at hearings of the joint conference committee of the railroads at Buffalo in mid-December. The proposed 25 pct reduction under domestic rates would put the interior mills on a more nearly even footing with Birmingham and Sparrows Point mills which enjoy a long head-start in laying down steel on the West Coast cheaply.

► Western steel consumers, with the support of mills which do not operate their own intercoastal steamship lines, may attempt, later, to secure a cut in the tariff on intercoastal water shipments of steel. Westerners contend that, although the tariff is added to eastern bases to form a West Coast price, mills operating steamship lines have much lower out-of-pocket costs. If the tariff were reduced, it is felt that West Coast steel prices would be cut.

► Fabrication-in-transit regulations may soon again come in for scrutiny, possibly by the ICC itself, with a view to narrowing the range of products on which substitute bills of lading may be inserted after fabrication.

► Projected construction of a new continuous hot strip mill and a cold reduction mill at the Sparrows Point plant of Bethlehem should put the mill in a better position to serve both the eastern market and expanding West Coast markets for light gage flat-rolled products, and might checkmate erection of an East Coast mill by Carnegie-Illinois.

► A sidelight of Olin Industries' refusal to purchase or lease the Tacoma, Wash., primary aluminum plant is that according to SPB, production costs were 15.379¢ per lb compared with 11.354¢ per lb at a more efficient government owned plant.

► Accurate and precise thickness gaging over a wide range can be accomplished by use of X-ray electronic devices. X-ray micrometers are readily capable of continuously measuring the thickness of any moving material with an accuracy of better than one pct and without any physical contact with the work.

► Early deoxidation of the heat results in consistent high quality steel, British investigations of the basic electric-arc furnace process reveal.

Two prime factors in the quality control of high-tensile steel are aluminum additions to control grain size and sulfide distribution and accurate temperature measurements during steelmaking. For the latter purpose a platinum, platinum-rhodium thermocouple so protected that it may be immersed in the melt has been most satisfactory.

► Critical factors in heat treating large transmission gears after shave finishing are the chemical composition of the atmosphere gases surrounding the parts undergoing heat treatment; prevention of air exposure of parts when the metal is sufficiently hot to permit occurrence of carbon depletion and high production with least sacrifice of available heat.

One military tank manufacturer solved these by using bell-type furnaces for heating and keeping parts inside the furnace under carburizing atmosphere until temperature is reduced to below 1100° F.

► Use of a copper cushion between shank and tip of high speed or carbide-tipped tools notably increases tool life. In the case a cushioned tool of 12 pct cobalt steel regrinding was necessary only after 192 sq in had been machined compared to a previous life of 24 sq in.

► There is little likelihood of early imports of pig iron from India while the exchange rate for rupees remains at 30.3¢. Pig iron sells at Calcutta at roughly $30 per gross ton.

ESTIMATING DIE COSTS

By RALPH HOWELL
Transue & Williams Steel Forging Corp.

. . . The great differences which frequently prevail in estimating the costs of forging dies can be due in only a small degree to variations in labor, burden, and material costs, but may well be the result of faulty records or inefficient recording methods. In this article the author presents the costing methods successfully employed by a large drop forging company.

VARIATIONS in the cost of dies for drop forgings should be thoroughly investigated by the buyer of forgings in order to avoid what may prove to be costly experience. Such variations may spring from several different causes. In a small degree they may be due to variations in labor, burden, and material costs, but the cost of labor used in sinking a set of closed impression dies varies only slightly among the different producers of forgings, and the cost of die blocks varies little or not at all. The burden or overhead costs vary in proportion to the type of die sinking equipment utilized, the size of the die making department, the volume of work going through the die making department, and so on. Therefore, such variations as occur are usually the result of careless estimating based on faulty records or inefficient cost recording methods which do not reveal the actual cost of a set of dies.

Few management and production executives outside the commercial drop forging industry comprehend the amount of engineering and highly skilled craftsmanship required to prepare and maintain a set of closed-impression forging dies and trimmer dies for the production of a specific part. The cost of these production tools seems to vary greatly, but such variations should always be found in correct proportion to the size, shape, weight, and other characteristics of the part.

A set of closed-impression forging dies is made to exacting specifications and represents the judgment of forging engineers, metallurgists, and production executives regarding the forging techniques to be employed for developing maximum metal quality in the forging. There is nothing about a set of closed-impression forging dies that permits of a standardized or straightforward procedure. It is not unusual to find a considerable variation between the cost of two sets of forging dies for a part of approximately the same weight. The only one competent to explain such a variation is a forging engineer of broad experience.

The procedure related applies to calculating the cost of closed-impression dies for drop, upset or machine, and press forgings, and the trimmer dies for these forgings. This is not a presentation of standard practice for calculating the cost of closed-impression forging dies, but is merely a description of one procedure that is followed in arriving at the cost of these production tools.

Information Required

After having made a thorough study of a part, for the purpose of properly visualizing the required draft angles and the location of the parting line; or for suggesting any changes in design or tolerances which would be of benefit to either the customer or the vendor, the following information should be at hand:

Net Weight: The net weight, as identified by the Industry, is the weight of a forging as it is shipped to the customer, except in instances where the forging vendor also does the machining. This weight is usually computed from a print by breaking down the irregular shapes into simple geometrical sections and totaling the parts.

Gross Weight: The gross weight represents the amount of material required to make a specified forging and includes the net weight, the weight of the flash, sprue, tonghold, punchout slugs and the shear or saw loss. The volume of the waste material mentioned is also broken down into simple geometrical sections and their weights calculated and totaled.

Material Size: The size of the material required, is governed by the largest cross-section of the part. The design of the part may be such that a certain amount of stock may be gathered in a rolling or fullering impression while reducing other sections of the stock. In some cases where large sections are coupled adjacent to long slender sections, such as, for example, automotive brake levers, it is advisable to figure either a size that may be gathered or rough upset as a preliminary operation on an upsetter, or a size that may be drawn separately on other equipment before fabricating in the forging dies.

Die Design: The design of the die depends chiefly on the stock-forming impressions required properly to forge the part. Most forgings, exclusive of hammer upset parts, require one or more of benders, fullers, drawing tools, rollers, flattening spaces, blocking and finishing impressions, and cutoffs. In some cases, due to close tolerances or large quantities, it is advisable to incorporate an impression known as a semi-finisher.

The answer as to what impressions

Form D-1 2M

Transue & Williams Steel Forging Corporation

Job No. DIE PRICE RECORD Type

Part No. Part Name

No. Imp. Customer

Date	Operation Name	Oper No.	Rate	Standard Hours	Price
				T	
				B	
				T	
				B	
				T	
				B	
				T	
				B	
				T	
				B	
				T	
				B	
				T	
				B	
				T	
				B	

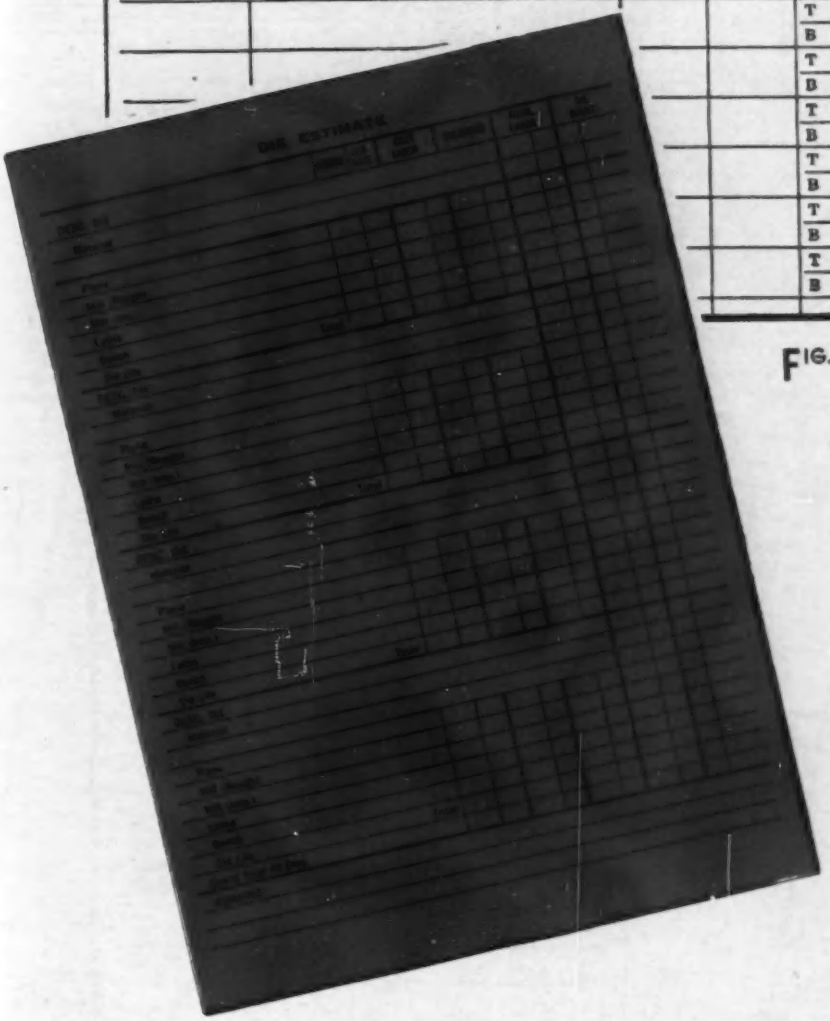


FIG. 1—Cost estimating sheet and standard record card.

should be incorporated in a die, is governed by the size of the material required to shape the stock as close in design to the blocking or finishing impression as possible, in order to produce the proper grain structure and eliminate the presence of checks, laps and seams. In cases where design and quantities warrant, it may be economical practice to design dies for finishing two, three, or four forgings at a time. In instances of this category, rollers, fullers, or benders, whichever the requirements may be, are designed accordingly.

Following the decision as to the design of the forging die, come the subsequent operations, such as hot trimming, hot punching, cold trimming, cold punching, coining, straightening, or gaging. Some of these operations may be combined, such as hot trim and punch, etc.

Estimated Die Life: The estimated die life per working is the expected number of forgings that can be produced before it becomes necessary to recut, and should be determined by records of similar parts and designs, with the proper consideration given to the tolerances and materials. Dies are normally considered as worn out when it becomes impossible to make forgings within the tolerances specified.

Having arrived at the estimated net and gross weights, the size of the material, the method of fabrication, and the die life, an estimator should now be in a position to set up a complete cost on the dies and tools.

Die Estimate Form: A die estimate form, fig. 1, consists of a printed form that allows ample space to enter separately a breakdown of the cost of the material, labor, burden and die replacement. A breakdown of the estimated hours for the various operations will result in a more accurately estimated cost, and will also be very useful in the final analysis.

Material: When preparing an estimate to represent the entire cost of all material required in the process of making the dies and tools for a specified part, the usual practice is first to concentrate on the blocks as to size and type. The block size is governed by the size stock and the amount of space needed to allow for the incorporation of the various forming and finishing impressions, together with the space that is considered practical for a striking surface.

The material required for the tools pertaining to the subsequent operations, such as trimming, punching, straightening, pressing, etc., may be arrived at by mensuration, and as a general rule, selected from stock. The description and costs of these materials should be recorded separately

Date of Order..... Customer..... Job No.....

Date Finished..... Name of Part..... Part No.....

Blocks: Size Top..... Grade Top..... Type of Die..... Block..... Die No.....
Bottom..... Bottom..... Nos.....

PLANE				IMP. MILL				ROUGH MILL				BENCH				LAYOUT			
Date	Check No.	Oper. No.	Hours	Date	Check No.	Oper. No.	Hours	Date	Check No.	Oper. No.	Hours	Date	Check No.	Oper. No.	Hours	Date	Check No.	Oper. No.	Hours
	LATHE																TEMPLETS		

TIME STUDY	
Plane	
Layout	
Imp. Mill	
R. Mill	
Lathe	
Templets	
Bench	
Total	
ACTUAL	
Plane	
Layout	
Imp. Mill	
R. Mill	
Lathe	
Templets	
Bench	
Total	

DIE RECORD

PART NAME PART NO. JOB NO.

CUSTOMER GRADE TYPE OF DIE

BLOCKS: SIZE

DATE	MATERIAL		LABOR & OVERHEAD		TOTAL COST		CREDITS		BALANCE		REMARKS
			HRS.	AMOUNT			FORGS. MADE	DIE USAGE			

m 455
3-10M-B

JOB TICKET
PIECE WORK

Name..... No.....

Job No..... Part No.....

Die No..... Oper. No.....

Operation.....

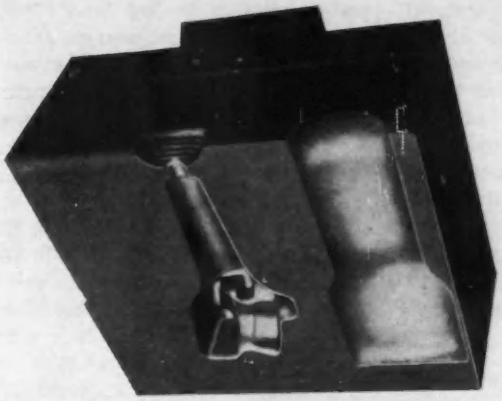
	Elapsed Time		F	Approved
			S	
			F	
			S	
			F	
			S	
			F	
			S	
			F	
			S	
			F	
			S	
Total Act. Hrs.				% Eff.

P. W. Earn..... Bonus.....

D. W. Earn. @..... D. W. Allow.....

Foreman O. K.....

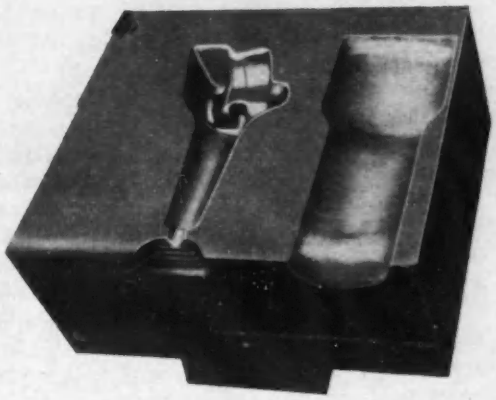
FIG. 2—Daily job card, detailed cost record card, and maintenance card used for recording the effective life and maintenance cost of a die.



LEFT

FIG. 3 — Blocking dies used in the manufacture of a truck steering knuckle forging weighing 50 lb.

o o o



RIGHT

FIG. 4 — An odd-shaped forging for an aircraft engine mount housing is completed in this one set of dies.

on the estimate sheet as to operation, size, type, and weight.

Machining And Benching: The various processes involved in the manufacture of a set of forging dies include such operations as planning shanks, locks, and impressions, drilling, slotting, rough and finish milling, lathe work, laying out and benching. The estimated time to be set up for these operations or work classifications may be arrived at by comparing each operation separately with time study records of past performances on similar operations and parts. These hours should be set up separately on the estimate sheet, and the operation fully described for the purpose of identification and future reference. The computed estimated labor and burden costs applying to these operations should then be set up in separate columns, opposite their respective descriptions.

Having set up the entire estimated costs of all materials, various labor and burden items, the separate costs of the dies and the tools required for the subsequent operations may be totaled. The sum of these totals results in the grand total cost of the complete set of dies and tools.

Die Replacement: The term "Die Replacement" or "Die Amortization" is identified as an amount of money incorporated in the estimated unit cost of a forging, for the purpose of building up a fund throughout the course of production to defray the cost of reworking or replacing worn out dies. Therefore, if the estimated die cost and die life are comparatively true, there should be enough money accumulated while producing forgings from the original working to offset the cost of reworking or replacing.

The replacement figure is arrived at by considering the total cost of one reworking, times the number of reworks possible, plus the total cost of the original set of dies and tools. This sum should be prorated over the total number of forgings estimated as possible to produce throughout the entire usefulness of the die blocks.

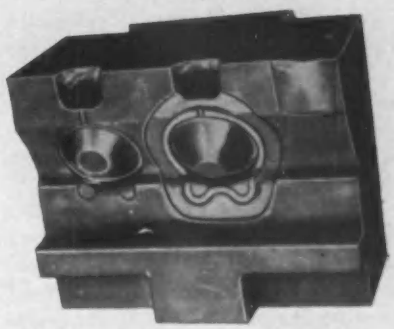
Die Casting Records

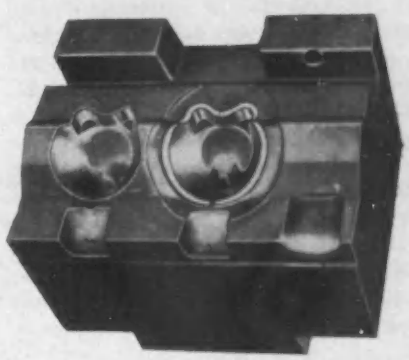
In order to build up a complete and accurate cost pertaining to a set of dies and tools, it is essential to have several cards designed for the purpose of convoying the proper fabricating information and costing records in detail, to the various departments from start to finish.

Standard Record Card: The standard record card, fig. 1, should provide for recording rate and standard hours applying to the various operations for either or both the top and bottom dies or the tools for the subsequent operations. On receipt of an order this card should be made up in duplicate for each piece of equipment required; one copy to be retained by the time study dept., and the other for the timekeeper and the die dept.

Piece Work Job Ticket: This ticket, fig. 2, provides a detailed description of the operation to be performed, and for the recording of the daily elapsed time that a workman was assigned to any specific operation; also for the department supervisor's daily approval, the total hours applied, and the percentage of efficiency. It also provides for the totals of daily piece work earnings, and for the final approval of the department supervisor.

It is headed daily for each separate operation, and the hours recorded and





computed by the timekeeper of the die dept. Besides serving as a record of the total number of hours for a particular operation, it also supplies the information for the tabulation of the daily payroll. When a job is completed and ready for the hammer, bonus slips are figured from these tickets and issued to the men who worked on the various operations required to complete the job.

Die Cost Record Card: This card, fig. 2, shows the date of an engineering dept. order, the customer, the job number, the date job has been completed, the name of the part and part number, together with spaces for the block size and grade of both top and bottom, numbers for storage location, and the die letters and numbers identifying the operation and workings. The posting of these headings is done when the job is received and started through the die dept.

It provides for recording information on the work done, by planer, lathe, impression mill, rough mill,

bench, layout, and templates. The recording includes date, the workman's clock number, the operation number, and the hours. The elapsed time to be charged to these various operations is posted daily from the Piece Work Job Ticket. Of special significance is a column on this card headed "Time Study," which provides spaces for the breakdown of the standard hours and various operations, which are posted separately from the Standard Record Card that is issued at the start of the job by the time study dept.

As the work is completed on any specific die or tool, the actual hours that have been posted daily from the Piece Work Job Ticket are totaled and transferred to a space on this card which provides spaces for the totals of the different classifications of work required to complete the job.

When the dies and tools are finished, all operational costs including material, labor, bonuses, and burden, are figured and itemized in an unused space on the card. This total results in the complete cost of the particular piece of equipment made. One of these cards is made up for the dies and one for each of the subsequent operations. Upon their completion, they are routed through the offices of the die dept. superintendent, and the works manager, for the approval; after which they are turned over to the cost dept. for the purpose of checking with the payroll, and are later returned to the time study dept. for analysis, filing, and future reference.

Besides furnishing the management with a complete detailed cost of the dies and tools, this record is used to compare the allotted time study hours with the actual hours, either as a total, or by separate operations. The actual time may also be used very advantageously when estimating similar jobs, and will gradually result in a very close relationship between the estimated and actual hours, as more records of this type are accumulated and used.

Die Maintenance and Replacement Records

The die maintenance and replacement record card, fig. 2, provides for identification of the customer, part name, part number, job number, size and grade of blocks, type of die, estimated maintenance and die life per working. It also provides for the date, material costs, total labor and overhead in hours and amount, total cost, credits in forgings made and die usage, balance and remarks.

Due to the importance of this record, an example of a hypothetical case is presented to show its use. Assume we have a job with an estimated die life of 4500 pieces, and a die maintenance of $1 each. Actual material cost is $1500 with 1500 hr labor and burden amounting to $3000, which results in a total die cost of $4500. This total has been billed to the customer upon completion of the dies, leaving nothing for a balance to apply toward the cost of the next working until forgings have been made. The finishing impression having been stamped 1-1 for identification, assume that the dies have been set up and a run of 1500 forgings made. At $1 each, as a maintenance, $1500 has accumulated as a balance for replacement cost. During the following months the dies are again set up and declared worn out after making 3000 forgings. Taking into consideration the 1500 forgings made on the original run and the $1500 balance, there is a total of 4500 pieces, and a balance of $4500 for replacement. Assume that the first reworking, which is identified as 1-2 die, required 1400 hr amounting to $2800. This being applied against the balance of $4500, leaves a balance of $1700 to apply toward the cost of the next reworking.

This record may continue for the life of the job and will be found invaluable for the purpose of conveying to the management all die cost figures, from a standpoint of materials, labor and burden, along with the fact that it also serves to develop a truer die maintenance figure.

The purpose of this article has been to reveal to new users of forgings, as well as to those who are continuing the use of forgings, a common procedure for calculating the cost of such production tools as closed-impression forging dies and trimmer dies. It is important to know the procedure by which accurate costs on dies are obtained, if troublesome experiences relating to the production of forgings are to be avoided.

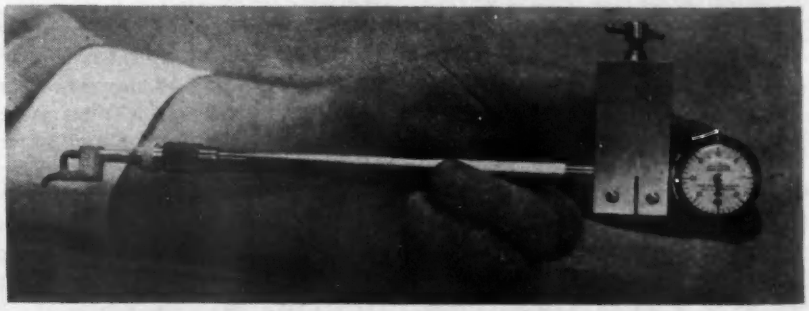
Handy Gaging Tool

FOR checking parts in relation to a fixed base line, a standard indicator attached to a vernier height gage is commonly used. In many cases, however, particularly where small bores and shoulders are involved, it is extremely difficult to reach the surfaces in question without the aid of special devices.

The accompanying illustration shows a simple, inexpensive attachment which has been found extremely useful in toolroom and inspection work. It consists of a steel block slotted to receive the height gage beam, and carrying a clamping screw for securing it to the beam. A gib is provided to avoid marring the beam with the end of the screw. Below the slot, a hole is bored to receive the shank of a standard indicator which is clamped by a small headless setscrew. A slot extending from the bottom of the block into this hole provides the necessity spring. One end of the hole is counterbored to receive the end of a piece of 5/16-in. steel tubing, approximately 6½ in. long This tube is also locked in place by a set screw. The other end of the tube is fitted with a No. 734 Brown & Sharpe universal attachment.

A piece of 1/16-in. drill rod runs through the center of the tube and forms the connection between the indicator and the attachment. Located in the center of the tube and about ½ in. from each end, are three brass bushings to act as bearings for the rod. These are pressed into place and are bored 0.004 to 0.006 in. larger than the diameter of the rod. To reduce the bearing area, the bores are deeply countersunk to leave almost a knife edge.

Easily made in any toolroom, this gadget simplifies many difficult gaging problems.



Welded Ship Failures Traced

AFT portion of a broken ship resulting from a welding fracture. By noting the apexes of the herringbone pattern, ship inspectors located the failure (arrow) to be in a butt weld in the main deck.

DURING the first years of this war, the country had to build many ships and build them quickly. The risks that go hand in hand with an extremely high rate of production was unavoidable, for the tests of workmanship is service at sea. Two years ago there was insufficient information available concerning the extent to which defective welding might be responsible for ship failure. As the result of subsequent investigations by the Navy, Coast Guard, American Bureau of Shipping, Maritime Commission, and National Bureau of Standards, it has been possible to trace many failures as caused by certain improper practices in workmanship. Defective welds, although not conceded the sole cause of ship failures, have been considered major contributing factors in many cases.[1]

[1] THE IRON AGE, *issues of Jan.* 6, 1944, *p.* 114 *and Jan.* 4, 1945, *p.* 83.

A defect in a weld acts as a notch and, if located in a strong member, may cause the vessel to fracture. Such a notch in a weld can contribute to the start of a failure which may penetrate the steel plates of a vessel. In cases of ship failures where it has been possible to examine the fracture, investigators have been able to trace it back to its source by means of the herringbone pattern or chevrons which form on the edge of a fractured plate. The apexes of the herringbone always point towards the origin of the fracture.

Included in the table is a list of faulty practices which have been considered the bases of defects found on ships in service. Incorrect joint design, one of the most important causes of the defective welding, is not mentioned in the table because it is the responsibility of the designer of the vessel and not the welder. Each defect, as listed, is not necessarily attributable to all the malpractices listed as the cause of that particular defect. In some cases, only one of the causes listed led to the specific defect, and in other cases one or more or all of the causes set forth were regarded as responsible for a particular defect.

Welders who have brought to the attention of the welding supervisor the condition of the joint which might be characterized by misalinement of parts, too large root opening, or cracked tacks have done much to eliminate causes of ship failures in service.

Faulty Welding Practices and their Results

	Saddle Welds	Cavities or Poor Penetration	Slag and Dirt	Shrinkage Cracks	Other Nicks and Cracks in Weld Metal	Buried Cracks and Cavities	Porosity	Nicks and Notches Not in Weld
(1) Fitup—improper fitup resulting in too wide or too narrow a welding groove	X	X	X	X	X		X	
(2) Plate edge preparation—beveled edge too shallow, ragged edges, uneven weld groove, etc.	X	X			X			
(3) Electrode—use of wrong size or type	X	X		X	X		X	
(4) Electrode—too dry or too damp			X				X	
(5) Welding arc—too long or too short			X				X	
(6) Machine setting—incorrect	X	X	X	X	X		X	
(7) Speed—excess		X	X				X	
(8) Sequence—failure to follow proper sequence				X	X			
(9) Preheating—failure to preheat when required				X	X			
(10) Chipping—improper chipping of weld groove at weld intersection	X	X	X		X			
(11) Chipping—improper chipping, use of diamond-pointed tool	X	X	X		X			
(12) Chipping—failure to back chip	X	X	X		X			
(13) Chipping—careless chipping; knocking off clips instead of chipping them off								X
(14) Craters—failure to chip craters out, or fill them in at end of welds				X				
(15) Cleaning—failure to clean welding groove properly or to clean beads between passes		X	X				X	
(16) Peening first pass					X			
(17) Bobbing or caulking of weld defects to stop leaks—welding over cracked tacks						X		
(18) Use of slugs		X						
(19) Striking of arc—careless striking on plating								X

Continuous Gaging With

X Ray Micrometer

. . . The thickness of sheet in motion can be gaged with high sensitivity by a device which combines X rays and electronic elements It can be applied to measure the wall thickness of long metal tubing at any point, and in the case of coated metals, the thickness of the coating and that of the backing plate can be measured independently.

By ROBERT C. WOODS
and
FREDERIC FUA
Standard Electronic Research Corp., New York

WHILE remarkable progress has been made heretofore in the industrial application of X rays, for the most part these advances have been confined to the searching out of flaws and to the study of crystalline structures by means of recordings on photographic films or by visual fluoroscopic inspection.

In some isolated cases the combination of X ray and electronic circuits have been put to work in the factory. For example in 1939 the first fully automatic X ray electronic inspection and sorting apparatus was successfully installed and operated in a plant at Oneida, N. Y.[1] This device satisfactorily examined and sorted 10,000 items per 16-hr day for 2 years until improvement in manufacturing processes rendered its use no longer necessary. While such instances are rare, the success and practicability of the applications showed that X ray electronic devices had at last graduated from the laboratory stage and were ready to go to work on the production line. Advent of the war caught the X ray electronic field in mid-development and more urgently required tools took precedent, thereby retarding its consummation. But now industry in general, and the metal industry in particular, will undoubtedly avail itself of the really remarkable industrial advances made possible through use of these new applications.

[1] *R. C. Woods and L. P. Kenna, Electronics,* 14 (4), 29 (1941).

X ray electronic devices are like microscopes in that, while they may be a standard piece of equipment, they are by no means to be thought of as applicable to only one particular type of work or product. They will become universal in their scope and will become many different things to many different industries. For instance, in one of its forms, the X ray electronic device is a most accurate and precise thickness gage over a wide range. It is readily capable of measuring the thickness of any material—metal or otherwise—with an accuracy of better than one pct and do it continuously on moving materials without any physical contact with the work whatever. In practice, this means that a plant rolling thin metal foil of, say, 0.0003 in. thickness can keep its product to that thickness with a variation of not more than 0.000003 in. Foil is here used only as an example to illustrate the extreme sensitivity of such a device. Fortunately, the precision of an X ray electronic gage is not limited by absolute values but measures percentage variations regardless of thickness. Thus, the above illustration of 1 pct accuracy might just as easily have been expressed in terms of brass strip, sheet steel, boiler plate, plastics or cardboard.

The same can be said of bars and rods, except in these it is also possible to detect flaws and tiny imperfections. With a micrometer, it is a simple matter to measure the wall thickness of seamless tubing at the ends. But it is possible by nondestructive X ray test to tell what the wall thickness might be in the middle of a tube 40 ft in length. Applications to be discussed hereafter are, among other, the detection of defects in leaded bearings, the distribution of lead, silver, etc. in metallic suspensions, the continuous measurement of conductor wire concentricity in insulated cable, the measurement of the thickness of metallic coatings.[2]

[2] *For comparison of methods see article "Measuring Wall Thickness by Gamma Rays,"* THE IRON AGE, *issue of Aug.* 30, 1945, *p.* 36 *N.*

The following is a brief description of a recently developed X ray electronic device. It utilizes the principle of differential absorption of a divided X ray beam to measure the thickness of a sample against the known thickness of a standard. In fig. 1, (1) is a source of X rays from which two parts of the single beam are chosen for use in an electronic system. In one direction of the beam a chamber (2), is placed so as to pass a current when struck by the rays. Opposite to it an identical chamber (3) is located. These detector chambers are electron multiplier cells modified to respond only to X rays. They are electrically connected at (4) so that the current output from one opposes the output of the other; that is, they are bucked. From (4), the circuit passes into a conventional amplifier, A, and thence to meter, M. When chambers (2) and (3) are in the same X ray beam, they both receive the same amount of X rays, and their current outputs are

identical. These two currents of equal magnitude are opposed to each other at (4), and one will quite naturally cancel the other. Therefore, no current will reach the amplifier hence, none will leave the amplifier to energize the meter, and M will give no indication except that the entire system is in a state of complete balance.

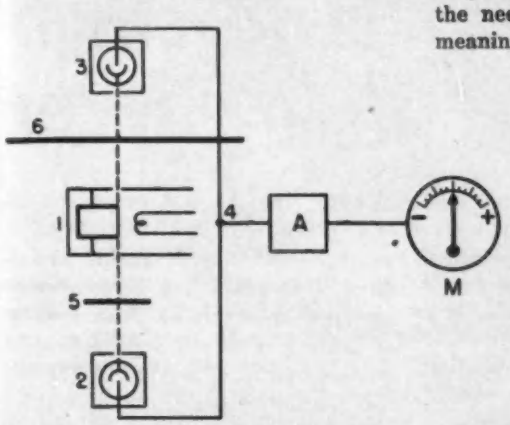


FIG. 1—Electric balance system as applied in the X ray thickness gage. The absorption of X rays by sheet (6) is balanced by the absorption occurring in the standard (5) of known thickness; (2) and (3) are X ray detecting cells. Difference of absorptions registers on the meter within an accuracy of one pct.

Balance Circuit Principle

It is important to note at this point that the balanced circuit is the crux of the stability and reliability of the device. What happens, now, if something goes wrong; if the X ray voltage changes, for example? Since the intensity of X rays falling on each chamber is always the same, if it changes for one, then it must change similarly for the other, the two chamber outputs will again buck each other and cancel out. Result, still 0. This state of affairs holds good throughout the whole system. In short, whatever accident befalls one side of the circuit also happens to the other and balance is maintained.

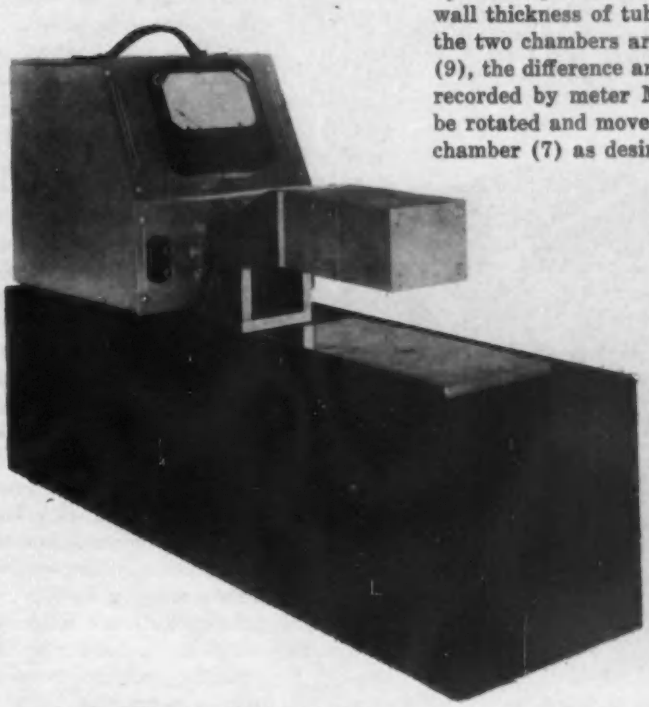
In between the X ray source and chamber (2), a sample, (5), of some standard material is placed; e. g. a piece of steel sheet of known thickness. Between the same X ray source and chamber (3) is placed another steel sheet, (6), of unknown thickness. If sheet (6) is exactly the same thickness as (5), then the same intensity of X rays passes through sample (6) as passes through (5), and chambers (2) and (3) are as before identically energized, then currents of the same magnitude meet and oppose each other at (4), nothing enters the amplifier, and meter M again registers nothing, indicating that the two steel sheets are of identical thickness. But if (6) is slightly thicker than (5), less X rays reach chamber (3) than reach (2), the currents arriving at (4) are unequal, then this difference passes into A where it is amplified and handed on to the meter, the needle of which swings to plus, meaning that (6) is thicker than the standard, (5). Or if (6) is thinner than (5), the same process takes place in reverse and M then swings to minus. The sample (6), if desired, can be moved rapidly during the measurement — as strip material moves when issuing from the mill— but the balance system will not be upset by this motion as long as the thickness of the sheet being measured does not deviate from that of the standard. Sample (6) can move or whip up and down over relatively wide limits in the space between X ray source and chamber without disturbing the accuracy of such an instrument.

Fig. 2 shows a gage head and meter designed for use on a strip steel mill. The meter is shown resting on the gage head for demonstration purposes, but when installed it will be mounted on the mill. The small super-structure is the gaging chamber, while the oblong black box contains the X ray tube, balance chamber, and standard insert. The power controls and electronic circuit components are enclosed in a box which may be situated in any convenient place.

Fig. 3 is a sketch of a setup for measurement of tubing wall thicknesses. In this case the arrangement differs slightly from that of fig. 1, but the principle remains the same. Reference (1) is the X ray source, the beam of which is split by lead diaphragm (2). The beams emerge pencil-like from the two circular holes (3) and (4). Detector chamber (8) receives the X rays which have passed through the standard sample (6), while chamber (7) is energized by the rays traversing the unknown wall thickness of tube (5). Outputs of the two chambers are then opposed at (9), the difference amplified by A, and recorded by meter M. Tube (5) may be rotated and moved lengthwise over chamber (7) as desired.

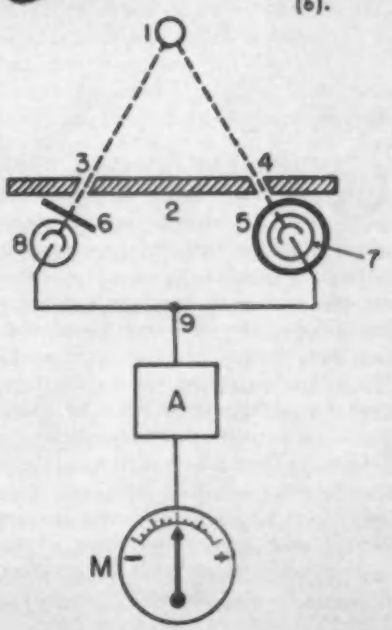
BELOW

FIG. 2—Typical X ray thickness gage measuring head, showing upper detector chamber and thickness indicating meter temporarily set on box containing X ray tube, balance chamber and standard sample. In practice the meter is usually on the mill. Power controls and electronic circuit components are in a box, not shown.



BELOW

FIG. 3 — Principle of X ray gage as applied to measurement of tubing wall thicknesses. X ray beam is divided by lead plate at (3) and (4). The absorption of the rays of tubing (5) is balanced by the absorption in the standard sample (6).



Quality Control of High-

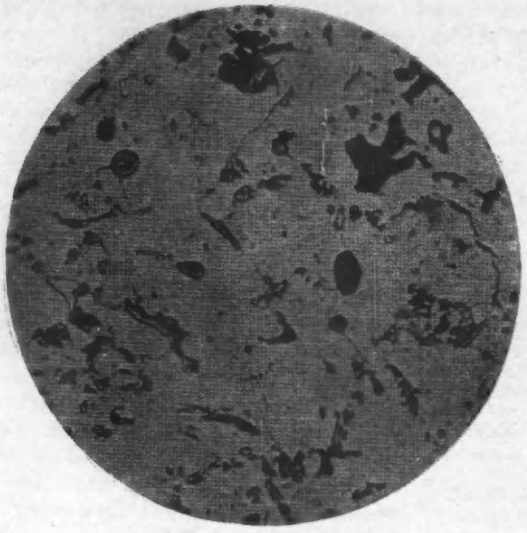
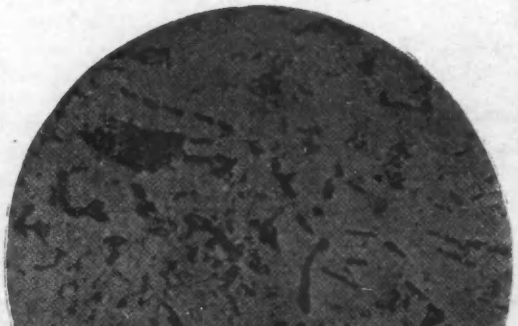


FIG. 1—Nonmetallic inclusions in cast Nos. B1626 (above) and B1628 (below) at 500X.



o o o

GENERALLY speaking, there are two ways of operating basic electric-arc furnaces working on the two slag process. One method is to melt the charge and boil out the carbon to the required figure and remove the oxidizing slag before any deoxidizing additions are made. The other is to start the killing reactions by adding some form of deoxidizer (generally ferromanganese or silicomanganese) before the oxidizing slag is removed. Both processes have been used extensively in this investigation, and several variants of the second were tried. While excellent steel can be made by either process, it has been found that steel of the highest quality is more likely to be obtained consistently when deoxidation is commenced early in the heat than when left until after the oxidizing slag has been removed or the second slag added.

As far as possible all operating conditions have been standardized, commencing with the makeup of the charge, through melting and refining to teeming. Whatever method is used the correct place to deoxidize basic electric steel for castings is in the furnace, and no amount of subsequent dosing will fully make up for deficiencies there; conversely, if the job is done properly in the first place the steel does not need dosing afterwards. The addition of aluminum to the metal as it leaves the ladle is not permitted; the practice still has its uses, but so far as basic electric steel for castings goes it is an anachronism.

The advantages of a controlled inherent grain size have long since been recognized in connection with wrought steel because of the vast amount of work which has been done following the initial investigation of McQuaid and Ehn on abnormality,[1] and for most purposes a fine inherent grain size is preferred. The importance of inherent grain size in steel for castings has not received anything like the same attention.

A knowledge of the McQuaid-Ehn grain size may be of value as an indication of the probable behavior of the steel under a given set of conditions, but it is important to know the effect of variations in steelmaking practice on the structure of the steel in the condition in which it will be used. Usually, the smallest grain size and the most uniform distribution of pearlite and ferrite grains are desired. The grain size depends chiefly on the temperature of treatment, rate of cooling, and austenite coarsening characteristics of the steel. The even distribution of pearlite and ferrite is directly related to the homogeneity of the steel, the segregation which takes place during the solidification of the steel usually leads to uneven distribution of the ferrite and pearlite after annealing, the slower the cooling after annealing the more pronounced the separation into pearlite-rich and ferrite-rich zones.

For some purposes a large addition of aluminum has been advocated as a primary deoxidizer; these experiments compared such an addition with ladle additions and with heats to which no aluminum was added. The conditions were, no aluminum addition; additions of 1 lb and of 3 lb per ton added to the metal stream in the ladle, and the addition of 6 lb per ton added under the oxidizing slag immediately before slagging. The McQuaid-Ehn grain sizes, determined under standard conditions, are shown in table I.

When the structures of the annealed steels were examined under the microscope it was easy to draw a distinction between steel to which, on the one hand, none, or only a little, aluminum had been added, and, on the other, steel to which relatively large aluminum additions had been made; but it was not possible to distinguish between heats to which 3 lb per ton of aluminum had been added in the ladle or 6 lb per ton added in the furnace; sometimes the one and sometimes the other gave the finer structure. There was no doubt about the influence of 1 lb per ton and 3 lb per ton added to the ladle; the latter gave the smaller individual grains of pearlite and ferrite, although there was not much to choose between the two in the matter of general arrangement and size of the cellular formation of ferrite kernels and pearlite

Tensile Steel Castings . . .

. . . Two main factors in controlling the quality of high-tensile steel for castings are aluminum additions to control grain size and sulfide distribution, and accurate temperature measurements. These practices are discussed in an article by W. West, C. C. Hodgson and H. O. Waring that appeared in the "Foundry Trade Journal," Sept. 20, 1945, and abstracted herein.

network in instances where this was the type of structure present.

Concurrently with this work the influence of these additions on mechanical properties was determined, and without going into the results of this work in detail, the conclusions were that the use of 6 lb per ton of aluminum as a primary deoxidizer, without any subsequent additions, caused the steel to be slightly tougher than steel of similar analysis to which no aluminum had been added, or to which 1 lb per ton had been added in the ladle; but when comparing the addition of 6 lb per ton used as primary deoxidizer with 3 lb per ton added in the ladle a distinct advantage in favor of the ladle additions was indicated.

The general conclusion, therefore, was that a large ladle addition of aluminum to basic electric steel is an advantage in helping to produce a fine grain size and in increasing toughness, and, in general, produces results which are superior to those obtained when an even larger addition is used as a primary deoxidizer at an earlier stage in the steelmaking operations.

The preceding experiments were made without reference to the previously published work on the influence of aluminum additions on the nature and distribution of sulfide inclusions, and it is a remarkable coincidence that the addition decided on, 3 lb per ton, is around the optimum for obtaining high ductility. Most steel founders must occasionally have had the misfortune to make a cast of steel which was later found to possess ductility less than that usually associated with its ultimate tensile strength. The condition does not persist after forging; steels of similar analysis which vary markedly in ductility in the cast and annealed and the cast and normalized conditions usually possess almost identical ductility after forging, as illustrated by the results shown in table II.

No form of heat treatment which the authors have found will remove this dry condition from steel in the as cast condition if the heat of metal is predisposed to this defect, even such drastic treatments as homogenizing at temperatures as high as 2012°F left the low elongation steel B1626 (shown in table II) almost unaffected. It is now fairly generally agreed that this type of defect is due to the difference in size and arrangement of the nonmetallic inclusions present, particularly the sulfide inclusions. Typical inclusions in cast Nos. B1626 and B1628 are shown in the photomicrographs in fig. 1. The metal-inclusions interface area in the former must be many times that in the latter, for example, about 1000 of the smallest inclusions shown in fig. 1, above, could be packed into the largest of the inclusions shown in fig. 1, below, and would, of course, have a surface area about 1000 times as great.

This connection between the distribution of the nonmetallic inclusions and the ductility of the steel was referred to at some length by Sims and Lilliequist[2] as long ago as 1932, and since then a considerable amount of work has been done on the subject, notably by Sims and Dahle,[3, 4] and Crafts, Egan and Forgeng.[5] Views expressed on the problem, particularly by contributors to discussions, are by no means unanimous, but it does seem that in the matter of adding aluminum to well-killed steel for castings, either it should be given none or it should be given a really good dose. There appears to be slight evidence that an addition of calcium-silicon at the same time as a large addition of aluminum is beneficial in producing the right kind of nonmetallic inclusion. The melting procedure adopted by the authors (originally for reasons which had nothing to do with the distribution of inclusions) is the same as that recommended by some of the American workers referred to in their work on inclusion distribution and ductility. It can be confirmed that with present methods of slag making and finishing, test-pieces possessing a woody or dry fracture are very rare occurrences, and when found can generally be associated with something slightly abnormal in the slag condition. Whether this is to be interpreted as meaning that this has altered the amount of aluminum entering the steel has not been investigated here.

In connection with this and allied problems it would be most helpful if there were available really satisfactory methods for the determination of small amounts of aluminum and alumina in steel. Some analysts may be

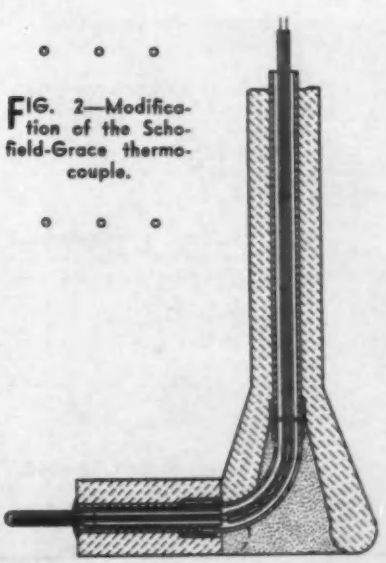


FIG. 2—Modification of the Schofield-Grace thermocouple.

TABLE II

Comparison of Two Steels Giving Dry and Ductile Fractures

Condition	Castings*		Forgings†	
Cast No.	B1626[1]	B1628[2]	B1626[1]	B1628[2]
Yield point (tons per sq in.)	24.0	23.0	27.8	26.8
Ultimate Tensile Strength (tons per sq. in.)	32.0	31.6	35.2	33.4
Elongation, pct	19.0	31.0	32.0	33.0
Reduction in area, pct	....	....	63.0	69.0
Izod, ft lb	....	....	67 to 68	75 to 80

* Test-bars 1½ x 1½ x 4½ in. when heat-treated.
† Test-bars ¾ in. diam when heat-treated.
[1] Cast B1626—C 0.21; Si 0.22; Mn 0.90; S 0.033; P 0.027; Ni 1.00; Cr 0.12; Mo 0.09, and Cu 0.09.
[2] Cast B1628—C 0.18; Si 0.19; Mn 0.90; S 0.029; P 0.020; Ni 0.98; Cr 0.13; Mo 0.11, and Cu 0.19. Normalized 1652° to 1697°F. Tempered 1184°F.

inclined to protest that such methods do exist, but it is the authors' experience that if this be so, knowledge of them is not very widely disseminated.

Temperature Measuring

Empirical methods for assessing the temperature of molten steel can yield good results when used by experienced observers, but it is recognized that more exact methods are desirable, and during the last few years much attention has been paid to methods suitable for measuring the temperature of molten steel, notably by the Liquid Steel Temperature Subcommitte of the Iron and Steel Institute Heterogeneity Committee.[6, 7]

Optical pyrometers are useful instruments for determining temperature after the metal has left the furnace; they are not satisfactory for temperature measurements of the metal in the furnace, although it is obviously of more importance to know the temperature at this stage rather than at some later stage when nothing can be done to increase the temperature of the metal and it is possible to take steps which are capable only of reducing the temperature.

It now seems fairly well established that the most satisfactory thermocouple for use in steel-melting furnaces is the platinum, platinum-rhodium combination. A considerable step forward has been achieved by Tinsley Industrial Instrument Co., who has developed an apparatus which amplifies the small emf produced by the couple, and enables the temperature to be recorded by means of a pen and ink mechanism on a quickly moving chart.[8]

The thermocouple emf operates a mirror galvanometer, and the beam of reflected light falls on a photocell. The degree of illumination of the photocell controls the rectified current output of a thyratron valve, and by an ingenious manipulation of this current in a resistance in series with the galvanometer, it is rendered proportional to the input voltage (that is, the emf of the thermocouple). The anode current through the thyratron valve is supplied from a 250-v section of a mains transformer, and it is used to operate a robust moving-coil type galvanometer with the pen-and-ink mechanism recording on the moving chart. The amplification is independent of mains fluctuations, characteristics of valves, and other components. The apparatus is reliable, and requires only slight periodical adjustments which can be carried out quickly and checked. The temperature of molten steel can be measured in 5 to 10 sec.

An important necessity for practical application of temperature measuring with an immersion thermocouple is to have this designed from the materials which are readily available and constructed in such a way that repairs and maintenance can be quickly and cheaply done. The authors have developed such a thermocouple covering which can be made from materials which are to be found in most foundries or are readily obtainable. The general arrangements can be seen from fig. 2. It is essentially a modification of the Schofield-Grace thermocouple.[6]

When first made up the thermocouple consists of 4 ft each of Pt and Pt-Rh wires silver soldered to compensating leads, about 3 ft of which are stripped of their covering and threaded through twin bored fireclay insulators. The rare-metal wires are both covered throughout their length with fine, transparent, fused-silica tubing and, in addition, excepting the last 8 in. or so from the hot junction, are enclosed in one length of ordinary hard glass tubing. This tube is plugged at each end with ignited asbestos to protect the rare-metal wires from contamination as much as possible.

The thermocouple and part of the compensating leads are enclosed in ⅝ in. diam thin-walled steel tube of suitable length, which is bent over at one end or may have a detachable 90° bend affixed. Whichever method is adopted the bend should be of sufficiently large radius to allow the thermocouple wires and insulation to

TABLE I

Effect of Aluminum Additions on McQuaid-Ehn Grain Size

Cast Serial	Aluminum Additions	McQuaid-Ehn Grain Size
2976 2981 3038	None	4 and 5, predominating, a little 2, 4 and 5 predominating, a little 3, 4 and 5 predominating, a little 3.
2989	1 lb per ton added to metal stream in the ladle.	4
3034		4 and 5 in about equal amounts.
3148	3 lb per ton added to metal stream in the ladle.	7 predominating, a little 8.
3150		7 predominating, a little 6.
3170		5 and 6 with a little 4.
3171		6 with a little 5.
3001	6 lb per ton added to the metal under the oxidizing slag as primary deoxidizer.	7 and 8.
3031		7 with a small amount of 5 and 6.
3166		7 with a little 6.
3168		7 with a little 8.

pass round the bend easily. With this arrangement the thermocouple can be easily withdrawn at any time for examination and replaced in a few minutes. The steel tube is covered with a Morgan graphite plunger-mixer as used for nonferrous metal mixing. These sleeves have an enlarged end which is convenient for providing a substantial covering for the bend in the steel tube. The portion of the steel tube which has to be immersed in the steel is protected by a block of the same graphite material, or electrode graphite may be used (see fig. 3). This may be screwed or wedged onto the short verticle end of the steel tube. This portion of the tube is also lined with ¼ in bore, thick-walled, fused silica tube fastened in with Purimachos cement.

The thermocouple is pushed into the steel tube until 2 in. protrude at the hot junction end, and this is covered with a thin transparent silica sheath cemented into the inner lining (fused-silica) of the end piece. The whole requires very little maintenance. The silica sheath can be renewed in a few minutes, and one set of the graphite sleeves will stand up to a few hundred temperature determinations. The short length of graphite which enters the slag will withstand 50 to 60 immersions if made of electrode graphite. The thermocouple is shown in use in fig. 4.

The couple complete weighs about 18 lb, and is easy to handle. It is important in using the apparatus that the thermocouple should be lowered into and raised from the bath with a vertical movement. If an attempt is made to move the thermocouple in the bath, or to drag it from the metal by a combination of horizontal and vertical movement the resistance of the metal will bend the transparent fused silica sheathed end, which makes it necessary in most instances for the couple to be remade as the insulators may be broken when the silica sheath is removed. With careful use two readings may be obtained from one transparent fused silica sheath, and 20 readings may be obtained from one hot junction before it is necessary to remake this. When doing this, half an inch of the platinum couple is cut away before refusing the hot junction. The rejected portion of wire constitutes valuable scrap.

It is perhaps hardly necessary to add that conditions for determining the temperature in the bath must be carefully standardized. Once the most satisfactory methods as regards stirring of the metal before the immersion of the thermocouple, the position in the furnace in which the thermocouple is placed, and other factors more or less governed by domestic conditions have been determined, they should be rigidly adhered to. It is not convenient or economical to take a large number of readings on one heat, but, should the temperature in the first instance be too low, it is possible after a little experience to estimate the length of time and the rate of power input which it is necessary to apply before the steel will have attained approximately the desired teeming temperature. By this method it is possible to approach consistently to within 50°F of the desired teeming temperature.

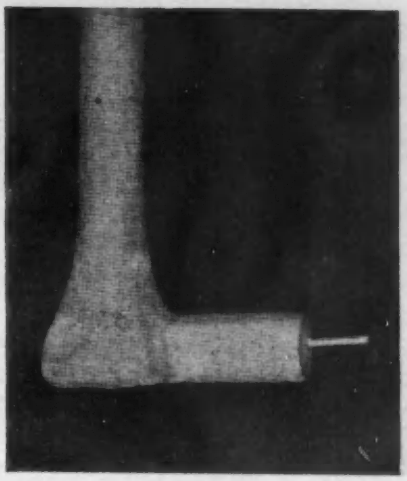


FIG. 3—Graphite sleeves are used to protect the thermocouple.

o o o

Bibliography

[1] McQuaid-Ehn, "The Effect of Quality of Steel on Case-Carburizing Results," T.A.S.M.&M.E., 1922, vol. 67, p. 341.

[2] C. E. Sims and F. B. Lilliequist, "Inclusions, Their Effect, Solubility and Control in Cast Steel," AIME, Technical Publication No. 453, 1932.

[3] C. E. Sims and F. B. Dahle, "Effect of Aluminum on the Properties of Medium Carbon Cast Steel," TAFA, 1938, vol. 46, p. 65.

[4] C. E. Sims and F. B. Dahle, "Comparative Quality of Converter Cast Steel," ASTM, 1942, vol. 42, p. 532.

[5] W. Crafts, J. J. Egan and W. D. Forgeng, "Formation of Inclusions in Steel Castings," AIME, Technical Publication No. 1184, Metals Technology, April 1940.

[6] F. H. Schofield and A. Grace, "A Quick-Immersion Thermocouple for Measuring the Temperature of Liquid Steel both Before and After Being Tapped from the Furnace," Second Report of the Liquid Steel Temperature Sub-committee, Eighth Report on the Heterogeneity of Steel Ingots.

[7] Third Report of the Liquid Steel Temperature Sub-committee of the Committee on the Heterogeneity of Steel Ingots. JISI, 1942, No. 1, vol. 145, p. 213P.

[8] D. C. Gall, "A Direct Current Amplifier and its Application to Industrial Measurements and Control," JIEE, 1942, vol. 89, p. 434.

o o o

FIG. 4—The thermocouple is here shown in use. The thermocouple weighs about 18 lb and is easy to handle. In using the apparatus, it is important that the thermocouple be lowered into and raised from the bath in a vertical movement.

. . . Preventing Surface Decarburization in

By E. G. de CORIOLIS
Director of Research and Development, Surface Combustion Corp., Toledo, Ohio

o o o

RECOGNITION of the importance of preventing surface decarburization has resulted during the war in the development of methods and equipment such as suitable atmosphere furnaces which assure that the desired carbon content of the steel will be retained following carburization. This is undoubtedly responsible for many cases of improved life of parts produced from highly alloyed carburizing steels.

The problem of preventing decarburization becomes more acute when the tooth surfaces of the parts being produced are completely finished prior to hardening, as is the case with the carburized gears produced. Due to close tolerance such methods as transforming retained austenite into martensite through the use of a refrigeration treatment is not considered desirable due to the resultant increase in volume so obtained, with the possibility also that internal cracks may be produced. Also there is little use in accurately controlling previous annealing and normalizing treatments, if the results are altered by any operation following carburization of the desired surfaces which may affect surfaces not subjected to carburization.

Considered much more important, however, is the prevention of decarburization of the carburized surfaces after the desired content has been built up by the carburizing process. When an accurately prepared and closely controlled furnace atmosphere has been used to produce a carbon potential of the desired content and carbon gradient and to the most suitable depth, surface decarburization during cooling of the parts to normal levels outside the furnace completely defeats the purpose of such close control.

It has been shown (See THE IRON AGE, April 19, 1945, p. 56, "Metallurgical Control of Shaved Aircraft Gears," R. E. Liebendorfer, Wright Aeronautical Corp.) that unless gears composed of AMS 6250 (SAE 3310) or 6260 (SAE 9310) steel are cooled to approximately 1000° F before removal from the carburizing furnace, sufficiently serious surface decarburization to cause subsequent galling or pitting of the tooth faces is likely to take place. In this case an ingenious alteration to an existing furnace serves to cool the charge, without exposing the gears to air until the desired reduction in temperature has occurred.

Where cost, high production and the reduction of available furnace capacity are of little importance, the obvious answer to the decarburization problem would be merely to shut off the furnace and let the parts cool to below the temperature where decarburization can occur while the carburizing atmosphere continues to surround them. Although cooling periods of up to 2 hr may be permissible in such instances, this is insufficient time for large parts such as large transmis-

o o o

FIG. 1—Twelve bell type carburizing furnaces with 14 bases are used for gears, shafts, brackets and other parts. Furnaces are of atmosphere type, heated by radiant tubes.

Large Shaved Transmission Gears . . .

. . . The methods and equipment used by a tank manufacturer since 1941 for heat treating large transmission gears after shave finishing are herein presented in reply to the claims by R. E. Liebendorfer (THE IRON AGE, April 19, 1945) that conventional carburizing practices are not applicable to shaved gears. This procedure which has not been previously disclosed, involves several innovations, notably in the prevention of surface decarburization by the use of bell type furnaces and cooling below 1000° F therein before removal and subsequent hardening.

sion gears. In addition gas tightness of the usual furnace must be checked and maintained during both the carburizing and cooling periods. Furthermore, the application of any such method as that of transferring parts from the carburizing furnace to a gas-filled cooling pit or chamber at or near temperatures of 1500° F is not suitable, since it has been shown that decarburization is not completely prevented, but is affected by the speed at which the transfer is made. Nor, (as mentioned by Mr. Liebendorfer in his article) can a furnace of the design used for aircraft gears be considered the best solution. Thus only a specially designed furnace, such as the bell type described later, affords a suitable solution where high production with economy is concerned.

The problem (insofar as it relates to heat treating large gears) therefore revolves around three factors; (1) the chemical composition of the atmosphere gases surrounding the parts undergoing heating or heat treatment; (2) the prevention of exposure of the parts to air when the metal is sufficiently hot to permit carbon depletion to occur, due either to furnace leakage or to exposure when the parts are being transferred from furnace to quench bath, or during any other manipulative operations, and (3) high production with the least sacrifice of available heat.

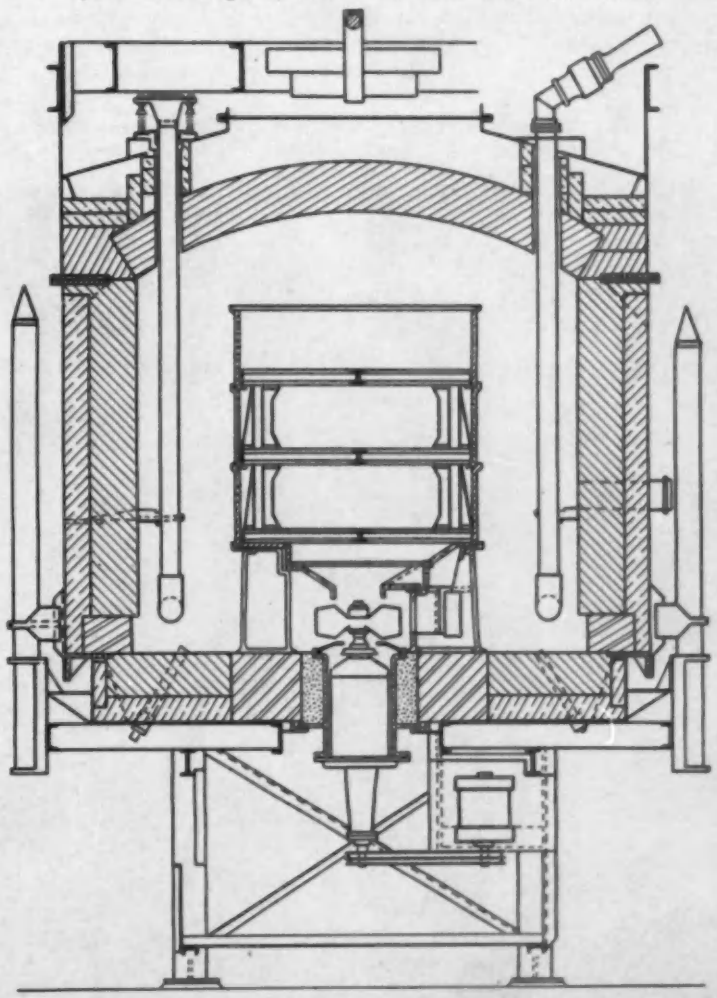
Large Automotive-Type Gears

In accordance with most recent practice in the manufacture of gears, all tooth cutting and finishing operations are performed on the gear teeth before heat treatment. For tank transmission, gears are crown shaved with maximum permissible runout of 0.003 in. with 0.001 in. to 0.003 in. taper on a 5 in. wide tooth. Gear diameters range up to approximately 18.75 in. and 21 in., the latter gear being of herringbone type. Tooth pitch is 4 to 5. Gear weight ranges up to 130 lb for the helical type. Weight of the herringbone gear is approximately 140 lb. Due to the large diameter, and operating temperature range, approximately 0.010 in. backlash is allowed between teeth of mating gears in assembling the transmission. The steel is approximately equivalent to SAE 4820, containing 3.5 pct nickel and 0.25 pct molybdenum.

For the critical part of the gear heat-treating operation, namely carburization and the prevention of surface depletion of carbon until the temperature has been lowered sufficiently, the Surface Combustion Corp. developed units of a new bell type furnace (fig. 2) and set up a program or time

o o o

FIG. 2—Section view of bell type carburizing furnace showing loading baskets, atmosphere circulating fan, radiant tubes and interior construction.



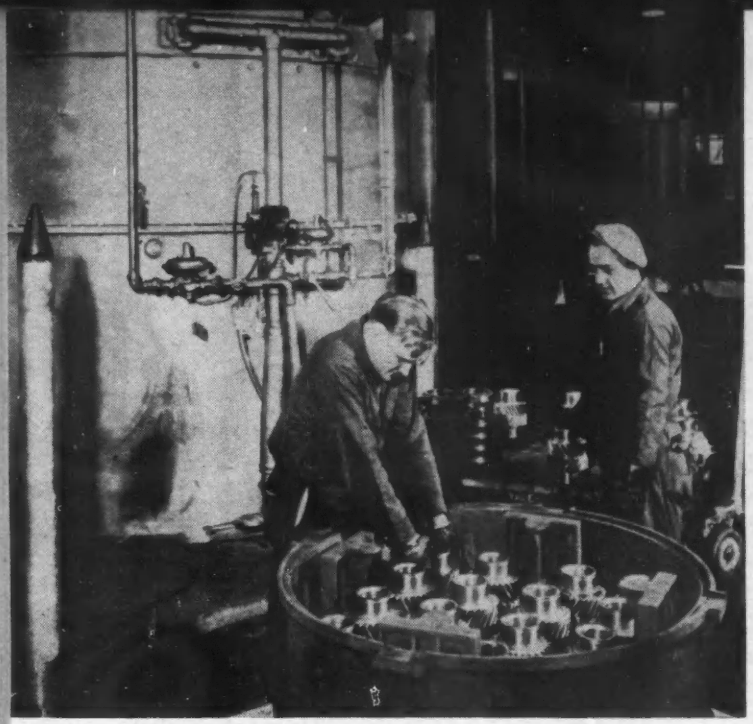


FIG. 3 — Loading basket of Surface Combustion bell type carburizing furnace with pinions for transmission. Basket diameter is approximately 14 in. ID. Diameter of bell inside radiant tubes is 69 in. Overall OD of bell is 10 ft.

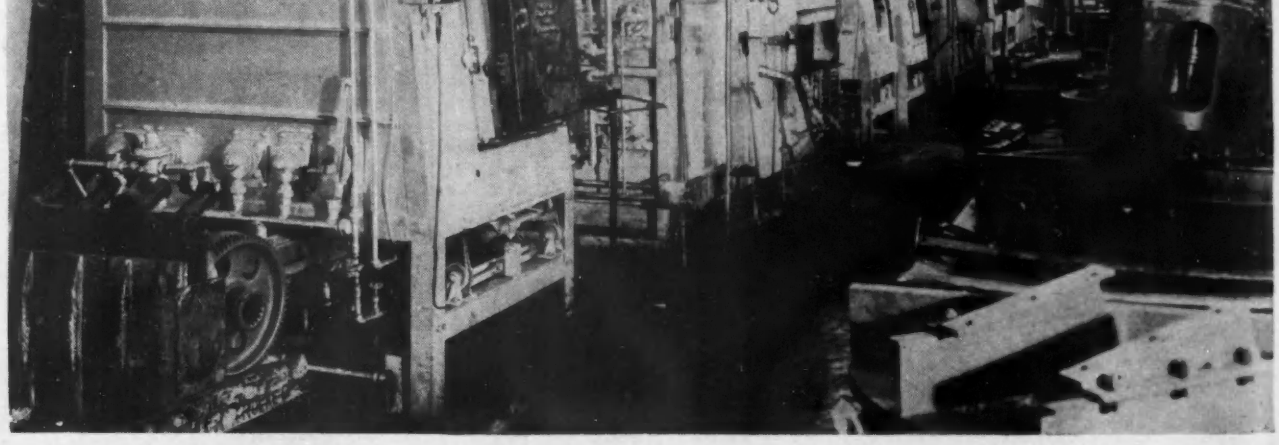
cycle which insures (1) equalization of temperature in thick and thin sections of the gears, (2) sufficient time to carburize to above 0.85 pct carbon, followed by (3) a sufficient cooling period.

For the carburizing operation, bell furnaces or covers and 14 bases are provided (fig. 1). Heating equipment is located in the bells which are raised or lowered by hoists on overhead runways. The additional number of bases makes it possible to allow ample loading and unloading time between heat-treating cycles. When seated, the bells are sand-sealed. The gas atmosphere is circulated by a fan located in each base. Special work baskets (fig. 3) hold the load and direct the flow of gases around the parts. Each furnace is heated by 14 hairpin type Surface radiant tubes using propane as fuel. The tubes are under suction so that no combustion gases can enter the carburizing zone. The net load per furnace of gears or other parts to be carburized is 1900 lb. to 2100 lb. Basket and grill weight is 2900 lb.

Carburizing Cycle: A bell at 1000° F from a previous cycle is placed over a loaded cold base. After closing the bell the Char-Mo gas atmosphere (one third CO and two thirds nitrogen plus a small percentage of hydrogen) is turned on as quickly as possible. When the full heating temperature is obtained, propane is added to the atmosphere in a ratio of 6.5 to 7 to 100 parts by volume, and is maintained as long as the full temperature exists. The load is then brought down to below 1100° F inside the furnace before it is removed. This is accomplished by shutting off the source of fuel to the tubes, but allowing a flow of air to continue under suction through them. The furnace atmosphere is continued during this period.

Upon removal the load is deep gray in appearance with little if any free soot despite the slow cooling period allowed. Test shows that the desired 0.86 carbon is obtained, although the hardness gradient rather than the carbon content is the governing factor. As a check on this, small blocks approximately the size of one of the

FIG. 4—Battery of six box type reheating furnaces for hardening gears and other transmission parts. Die quenching machines and tanks with oil agitators at right. One of the gears is shown at lower left. Furnaces are of radiant tube atmosphere type.



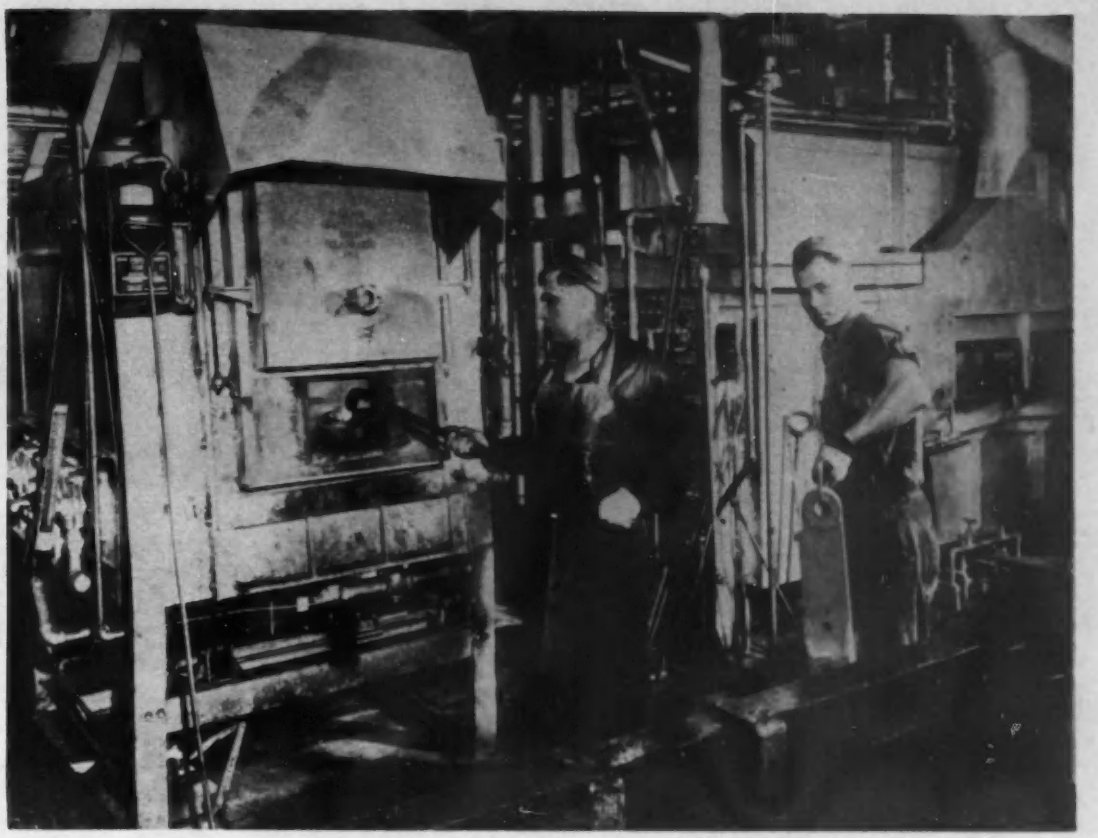


FIG. 5 — Removing pinion from batch type reheating furnace preparatory to quenching. Note edge of oil quenching tank directly in front of furnace. The pinion is exposed for but 1 or 2 sec.

gear teeth are used as test samples. The blocks are placed at several points in the furnace with each heat. By tapering the block before carburizing, then grinding the sides parallel after treatment, the depth and hardness of the carbon gradient is readily measured. The specified carbon gradient is from 0.95 to 0.90 maximum, down to 0.40 as determined originally by analyzing for carbon in samples obtained by 0.005 in. cuts. Additional carburized blocks are used to check for any possible surface decarburization after reheating.

Reheating and Quenching: The reheating equipment generally consists of three 6-ft diam rotary radiant tube fired Surface furnaces (fig. 6). However, where the work is too large to enter the doors of these furnaces, as is the case with the 19-in. and 21-in. gears, 6 standard Surface general heat-treat furnaces are available (fig.

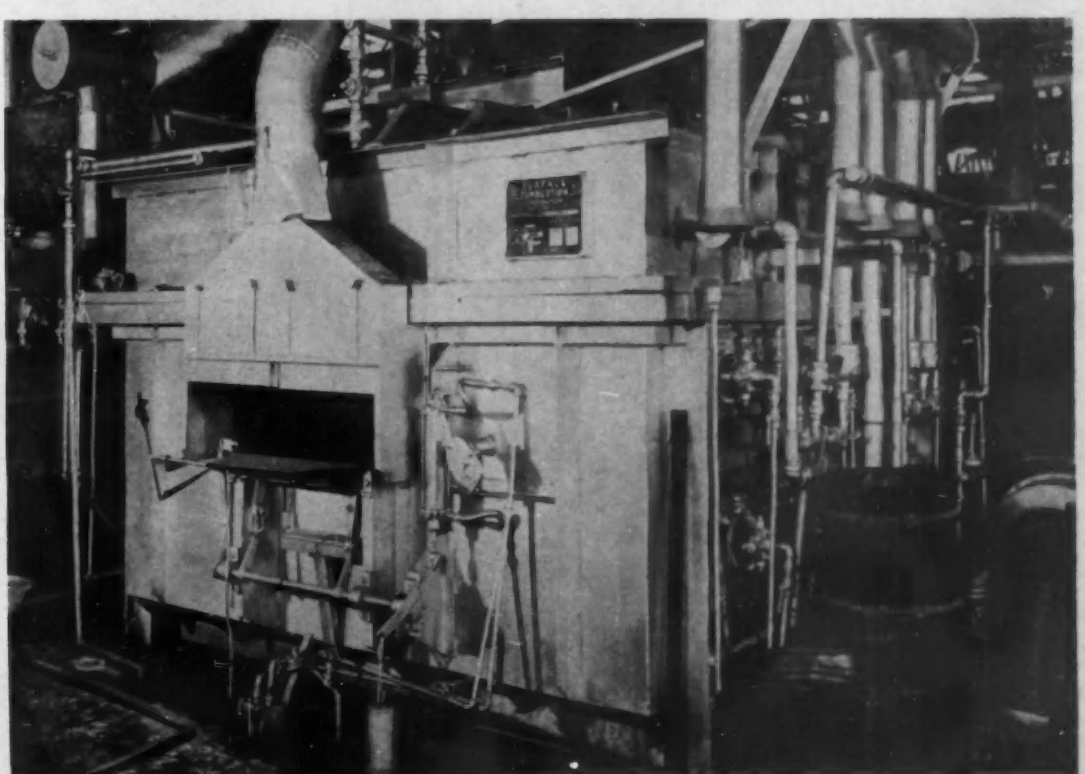


FIG. 6 — One of three radiant tube rotary type furnaces for hardening gears. Hearth diameter is approximately 8 ft.

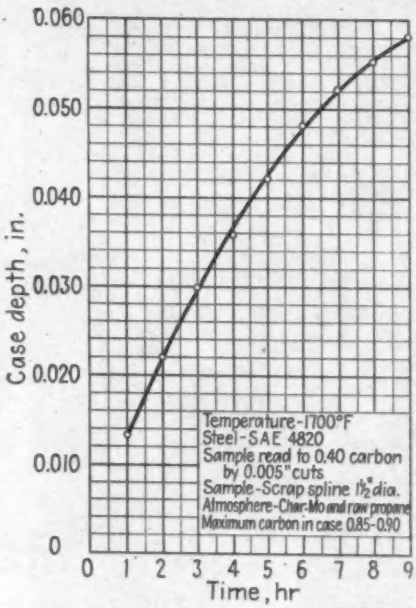


FIG. 7—Carbon penetration curve showing necessary hours to obtain desired surface carbon content.

4). Some smaller parts in addition to the gears are loaded on a small shovel or pan which facilitates handling into the quench, as well as loading. The atmosphere for these furnaces is similar to that used for carburizing and is provided by three single-tube generators, each batch unit having its own generator. Propane is also used to increase the carbon potential of the gas.

To maintain the previously established carbon content when reheating for quenching, the atmosphere maintained in the furnaces is similar to that used for carburization. The time between removal of the gears from the reheating furnaces and die quenching is but a few seconds, so that at no time during the entire operations is there any possibility that measurable surface decarburization can take place.

After reheating and quenching in Gleason die quenching machines, the gears are gray or black, typical of oil quenched parts but have no free oxide. Surface decarburization is nil. After a light shot blast the surfaces regain their previous "shiny" appearance, and insofar as the teeth are concerned are ready for assembling and preliminary running-in.

After the draw the desired minimum hardness of 63 Rc is readily obtained. To date it has never been below 64 Rc. The carbon penetration is shown in fig. 7.

In conclusion it may be noted that the foregoing method of handling the gears attains what should be the ultimate aim in heat-treating operations.

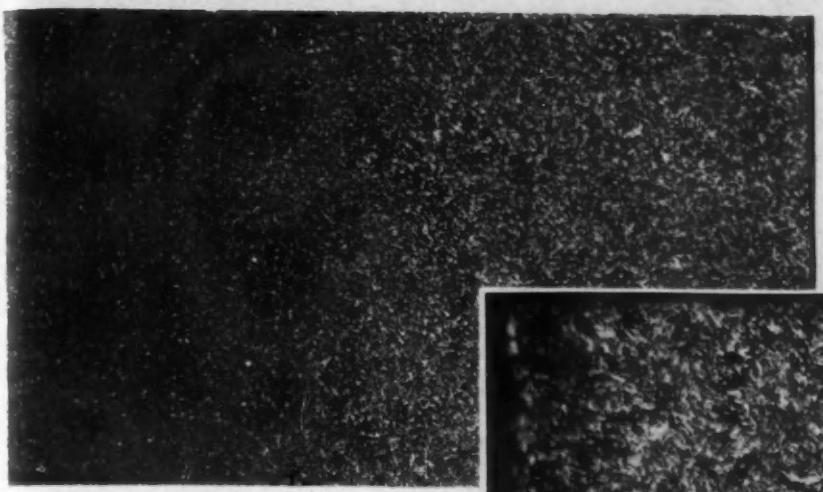
Heat Treatment of Large Transmission Gears

After shave finishing, the gears are heat treated as follows:

(1) Carburize..	To 0.60 in. to 0.070 in. case depth, 0.85 to 0.90 pct C. Time to temperature—7 hr (including holding 2 hr at 1400° F and 1600° F to equalize between thick and thin sections). Time at 1700° F—10 hr (Propane gas off 1 hr to secure desired C of case). Time to cool to 1100° F—4 hr
(2) Reheat.....	At 1500° F for 1.5 hr (To completely austenize material)
(3) Quench....	Decrease temperature to 1300° F and oil quench in die.
(4) Draw.....	At 350° F—2 hr.

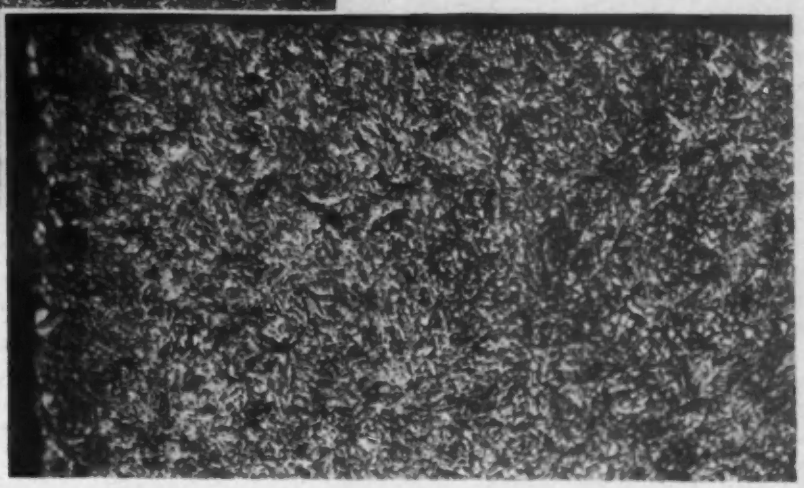
Following heat treatment the gears are lightly shot blasted. Only operations following heat treatment are grinding bearing surfaces and center hole.

FIG. 8 — Atmosphere gas is prepared in double unit generators as shown above. Gas capacity per unit is 1200 cu ft per hr of Char-Mo gas containing approximately one third carbon monoxide and two thirds nitrogen with a small percentage of hydrogen. About 800 lb of charcoal are consumed per 24 hr day. The gas is augmented with propane for carburizing.



ABOVE

FIG. 9—Surface of carburized tank gear showing freedom from decarburization. Etched in 3 pct nital; at 100X.



BELOW

FIG. 10 — Surface of carburized tank gear at 500X.

To eliminate the effects of surface decarburization by mechanical means, such as machining or grinding, certainly can be considered only a palliative. Nor can carbon restoration be more than a remedy for the problem, even though it is far better than removing carbon-depleted metal, and is sometimes the only possible method. Only when surface decarburization is completely prevented throughout all heat-treating processes, such as accomplished here, can a real cure for the problem be said to have been achieved.

Cushioned High-Cobalt Shaper Tools

USE of a copper cushion between the shank and the tip of high-speed steel or carbide-tipped tools has come into fairly general use during the past few years, as also has the use of a similar cushion brazed to the underside of solid tools.*

*"*Cushioning of Tipped Turning Tools,*" THE IRON AGE, *July* 20, 1944.

Extraordinary increases in tool life have been obtained, especially when 12 pct cobalt steel has been used, but almost all applications have been in lathe tools.

For shaper work, tools of this type with a hardness of 66 Rc have been considered far too hard and brittle, but some development work carried out by General Tool & Die Co. has yielded surprising results.

According to the company, a manufacturing plant was faced with the problem of shaping a block of Nitralloy on a surface 8 in. long by 16 in. wide to a depth of 5/32 in. The original attempts were made with 18-4-1 high-speed steel, and the total time for the job was 96 min. A change was then made to a 12 pct cobalt tool having a copper shim brazed to the bottom. With this cushioned tool the time was reduced to a total of 28 min, or a time saving of 70 pct. One roughing cut of 9/64 in. followed by a finishing cut of 1/64 in. gave an even better finish than the two roughing cuts of 1/16 in. each and the finishing cut of 1/32 in. which had been necessary with the former tool. Also the speed was increased from 60 strokes to 100 strokes a min without any difficulty and without setting up any noticeable vibration in the machine. The feed was increased from 0.010 in. to 0.020 in., and it was found possible to machine 192 sq in. per tool grind, as against only 24 sq in. with high-speed steel. Furthermore, the amount of regrinding was only very slight, thus giving a substantially increased overall tool life.

Another difficult job performed in the same shop consisted of shaping a 10 ft bar of 18-8 stainless steel, only ½ in. wide. Such a job would normally be performed on a planer, but as this was not available a shaper was used instead. The length of stroke was 1 in., and after every 12 in. of shaping the bar was moved over 12 in., reclamped, and shaped again for another 12 in. When using 18-4-1 steel a speed of 100 strokes a min and a feed of 0.010 in. were employed, resulting in a total time for the job of 140 min. With the cushioned 12 pct cobalt tool, however, it is said that the speed was increased to 200 strokes a min, and the feed to 0.015 in., thus cutting down the time to only 60 min. Tool life, moreover, was increased from 12 in. per grind to 48 in. per grind, and as in the previous case, very little grinding was necessary to restore the tool to good condition.

It is further stated that both of these operations were carried out on a number of pieces on a regular production basis, not under laboratory conditions, and would serve to indicate that the cushioned 12 pct cobalt tool, despite its hardness, is eminently suited for the extremely rugged conditions imposed by interrupted cuts. This is borne out by the fact that on continuous cutting the savings effected are by no means so high, since, apparently, the cushion is not so effective. Nevertheless, even on continuous cuts, the increase in tool life, particularly on hard-to-machine materials such as some of the high heat-resisting special alloys now being used in gas turbines, makes the use of cushioned 12 pct cobalt tools well worth investigating.

Sinters Economize Blast Furnace Operation

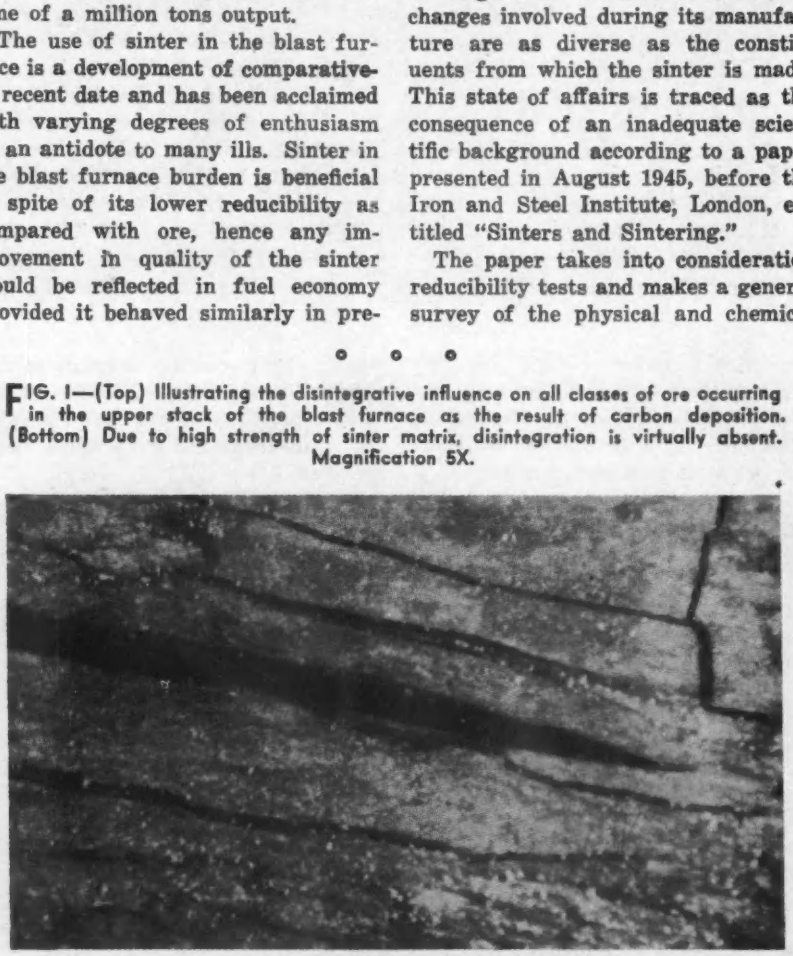
THE blast furnace is a machine that year in and year out is expected to achieve reasonable output of iron on the crudest of diets; the marvel is that any survive a lifetime of a million tons output.

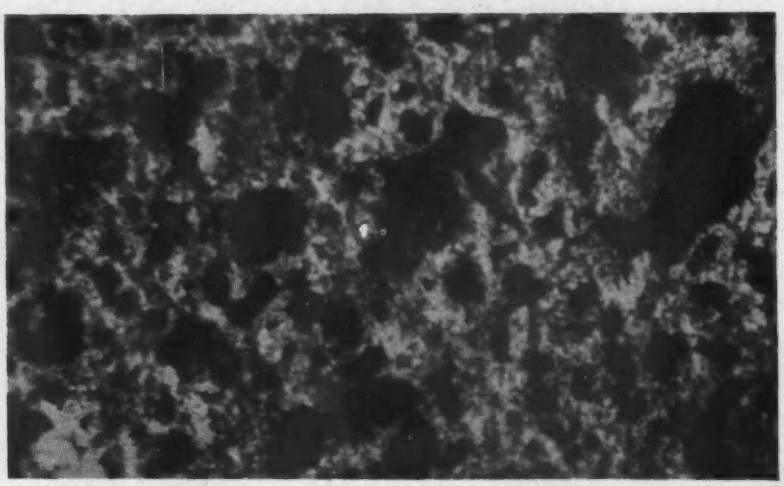
The use of sinter in the blast furnace is a development of comparatively recent date and has been acclaimed with varying degrees of enthusiasm as an antidote to many ills. Sinter in the blast furnace burden is beneficial in spite of its lower reducibility as compared with ore, hence any improvement in quality of the sinter would be reflected in fuel economy provided it behaved similarly in preserving an open burden. Sintering also affords a valuable means for the utilization of fines. However, opinions regarding both the essential qualities of a good sinter and the chemical changes involved during its manufacture are as diverse as the constituents from which the sinter is made. This state of affairs is traced as the consequence of an inadequate scientific background according to a paper presented in August 1945, before the Iron and Steel Institute, London, entitled "Sinters and Sintering."

The paper takes into consideration reducibility tests and makes a general survey of the physical and chemical changes involved together with a more detailed study of special aspects of the process which seem to have an important bearing on the future development of blast furnace technique. A large number of laboratory-made sinters in addition to a dozen or more commercial samples were examined and, by preparing the laboratory specimens under carefully controlled conditions, it has been possible to correlate various factors and thus to clear the way for a better understanding of, and possible improvements in, sinter production.

o o o

FIG. 1—(Top) Illustrating the disintegrative influence on all classes of ore occurring in the upper stack of the blast furnace as the result of carbon deposition. (Bottom) Due to high strength of sinter matrix, disintegration is virtually absent. Magnification 5X.





Physically, there is a fundamental difference between the structure of sinters and that of the ores from which they are made which is immediately apparent upon inspection. The predominant pores in an ore are not obvious to the naked eye, whereas, in the case of a sinter the cavities range in size from something just perceptible up to those which can be ranked as "approaching voids."

Chemically, one advantage arising from the use of sinter in the blast furnace burden is bound up with carbon deposition. This reaction, occurring in the upper region of the stack, is catalyzed by a variety of materials including the deposited carbon itself. An examination of fig. 1 shows that in a case of ores impregnation precedes deposition, whereas, in a case of sinters there is very little impregnation, and because of the high strength of the matrix, disintegration is virtually absent. The deposited carbon is easily detached by the movement of the burden and by blast, thus preserving a high percentage of voids in a region where the fines may otherwise predominate and so assisting a freer distribution of blast. An additional result that should be pointed out is that a substantial volume decrease during sintering occurs, so that again, given a good quality sinter, what really amounts to an enrichment of the burden takes place.

Fundamentally, sintering may be regarded as a means for utilizing fines. There are three main stages in sinter production: (1) Preparation of the raw materials, these usually con-

sist of ore, flue dust, mill scale, etc., which are mixed with the requisite coke and water and spread on some form of grate; (2) ignition of the mass, and (3) combustion of the fuel, maintained under suction to completion, when bonding occurs. Immediately after ignition, when the hot gases commence to traverse the bed, the transition of some of the water to steam disrupts the larger material. Most of the fines offer balling during mixing and are therefore submitted to a relatively slower steaming so giving a measure of porosity to the bed without disintegration. Decomposing carbonates perform a somewhat similar function, although at a higher temperature. The net result is the production of a general fluffing throughout the mass. Whether ignition is initiated on a carbon-enriched surface or otherwise, the time required and the rate and uniformity of its progress will depend on the porosity of the bed, so that the distribution both of the voids and the carbon is of vital importance.

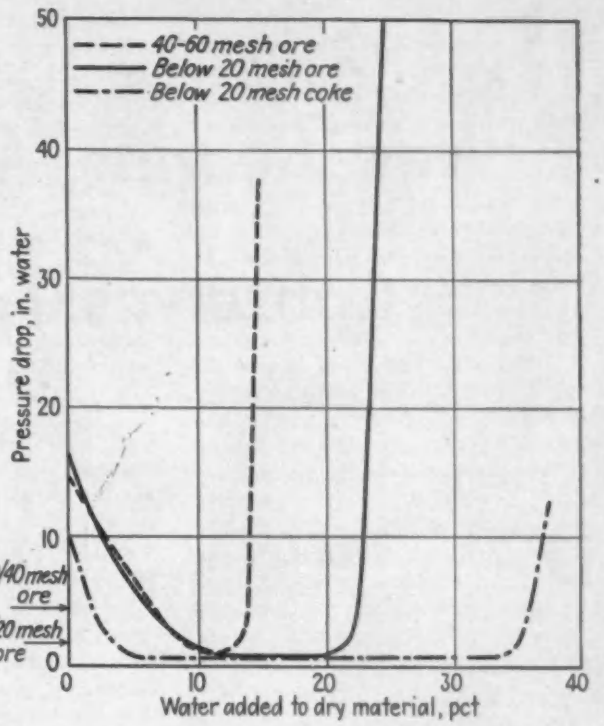


FIG. 2—Variation of resistance offered by a bed of material at constant air flow with progressive additions of water.

Nature of Added Carbon

It is by no means essential that the carbon initially present in the sinter mixture should be in the form of coke, although this may be the more generally useful. Slack coal may be employed if the ash content is not too high. Coal will often give better ignition and with kiln sinters its swelling characteristics can be advantageously employed to adjust the texture of the final product. Similar remarks apply to pitch. The harder pitches are easier for mixing. Soft pitch might be incorporated in admixture with crude low-sulfur oils applied by spraying. Water and oil could be added together as an emulsion. Other forms of industry waste high in carbon might be usefully considered.

The most careful control of temperature and time of heating will be of small avail if sufficient care is not given to the adequate preparation of the raw materials. There is segregation at every stage owing to the differences of both size and density and the tendency towards unequal distribution of moisture on particles of varying size, chemical composition and texture. The appearance of the materials on the conveyor belts from the various storage hoppers is most deceptive; it is only when one inspects the grid at the mixer that one realizes the size and quantity of the lumps which are carried through unnoticed. Measurements show that in uniform beds the voids gradually increase as particular size decreases, yet the resistance to suction increases. Besides the normal effect due to subdivision of the voids, the air flow is being constantly forced to change its direction as it encounters each new obstacle. Hence, when the constituents are not uniform, but fall within definite size limits, voidage is determined by the relative proportions of the intermediates, and this determines the grading quality.

The diversity of ores alone makes it obvious that there can be no single figure for optimum moisture content that will meet every requirement. Speaking generally, the addition of water (with, of course, proper mixing) first reduces and then increases the suction resistance, see fig. 2.

It is well to remember in connection with raw materials that it is a mistake to use any and every kind of iron-bearing material that happens to be on hand for the making of sinters, in the hope of securing its ultimate reappearance as metal, without due consideration of all the factors involved. Closer scientific coordination is imperative between the selection of the raw materials, the computation of the mixture, the grading of all constituents, the assessment of moisture, the control of segregation and finally time/temperature regulation to secure sinter best suited to the particular requirement of the furnace in which it is being employed.

Rapid Ore Testing

THE S. K. (South Kensington) test for the rapid determination of porosity of ores is based on the principle of filling the voids in turn with mercury, air and water, H. L. Saunders and H. J. Trees reported to the autumn general meeting of the British Iron and Steel Institute. For porous materials the voids are greatest for air, less for water and least for mercury. The differences between the values are a measure of the porosity relative to the fluids employed.

After examining several specimens of ore and sinter, it was found that ores are more porous than sinters, while the voids of mixtures are additive.

New Bearing Alloy Conserves Tin

o o o

. . . This investigation outlines the development of a bearing alloy low in tin, as compared to the 80-10-10 alloy. Physical properties, wear resistance, and metallographic comparisons are made.

o o o

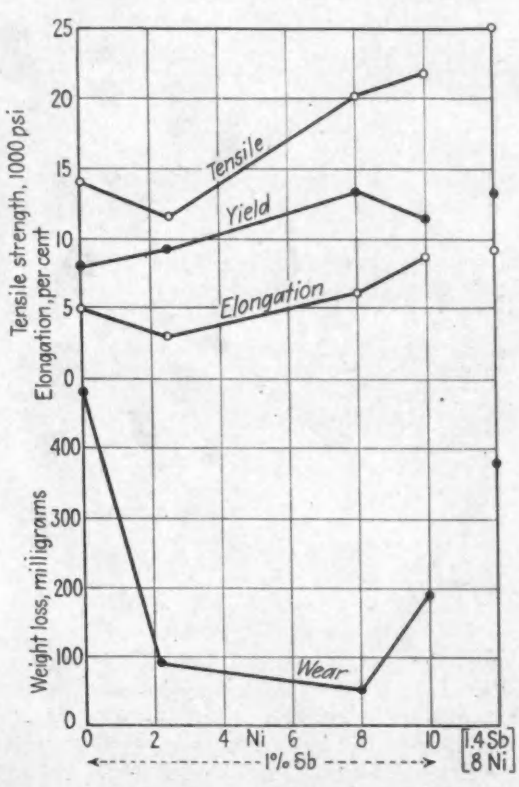
DURING the war and current postwar period, the supply of tin in this country has steadily decreased and a continuous effort has been made to use alloys that contain lower quantities of tin or are free of it entirely.

The bronze industry is one of the major tin-consuming fields and consequently is one of the best means of saving tin, provided satisfactory material substitutions can be made. One of the commonly used bronzes, the 80 pct copper, 10 pct tin, 10 pct lead alloy, is used for heavy duty bearings. In a paper presented at the AIME Institute of Metals fall meeting, entitled "Nickel-Antimony-Lead-Copper Bearing Alloys," John T. Eash, research metallurgist, The International Nickel Co., Inc., outlined the development of an alloy of low tin content to replace the 80-10-10 type.

The program followed was to match certain metallurgical properties of the 80-10-10 bronze that are known to be related to good bearing qualities. Such properties as microstructure, hardness, compressive yield strength, ductility and castability have been considered, and certain simple wear tests have been made.

The castings investigated were made in an induction furnace. The melts were poured into green-sand molds at about 200° F above the liquidus temperatures estimated from constitutional diagrams. The castings employed consisted of (1) a bushing for measuring castability—a bushing 3⅛ in. OD x 2 in. ID x 3¼ in. long, cast horizontally with a heavy riser in the cope at the gated end was found most suitable, (2) wear disks, 2⅝ in. in diam x ⅝ in. thick, poured and fed through a central sprue, to conduct Amsler type tests, (3) tensile bars cast to shape, and (4) compression bars machined to 0.505 in. diam x 1 in. long. Metallographic specimens were cut from the wear disks, examinations being made close to the wearing surface.

Various alloy additions were made on 10 pct lead copper specimens to find the effects on hardness, fracture and microstructure. The fractures of



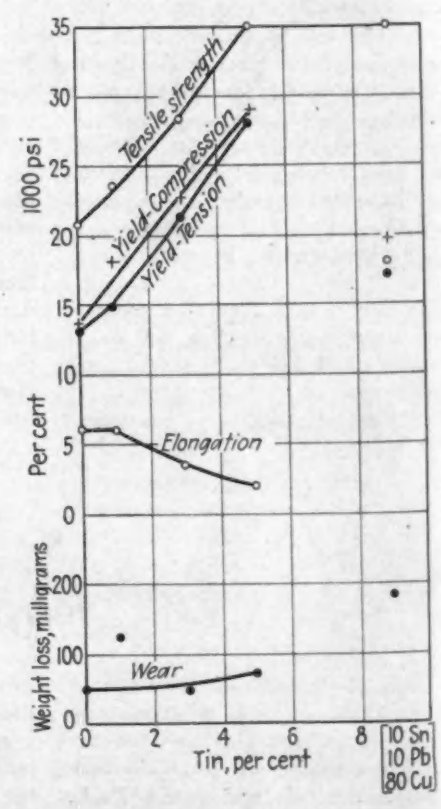
LEFT

FIG. 1.—Effect of nickel on 10 pct copper.

o o o

RIGHT

FIG. 2—Effect of tin on 10 pct lead, 8 pct nickel, 1 pct antimony copper.



the bushings containing 2.5 to 8 pct nickel and 1 pct antimony were sound and the most satisfactory of all produced, and had a hardness of about 50 Bhn.

Patterned after work done on Amsler wear tests at the Bureau of Standards, the test employed a bearing metal disk and a steel disk rotating against one another on their peripheries under a load of 12 lb. The bronze disk rotated at 440 rpm and the steel disk, which was SAE 3150 heat treated to the 330 Bhn, rotated about 10 pct slower in the opposite direction. The standard of comparison used was the 80-10-10 alloy. From the wear data, it was noted that 10 pct lead copper with 1 pct antimony or 2.5 pct nickel alone was inferior to 80-10-10. Not until 2.2 to 10 pct nickel and 1 pct antimony were added together did the wear improve substantially; with 2.2 to 8 pct nickel, wear resistance superior to 80-10-10 was obtained and at 10 pct nickel the wear was equal. Raising the antimony to 1.4 pct caused an increase in the wear loss.

From the standpoint of wear resistance alone, the bearing containing 2.2 pct nickel, 1 pct antimony, 10 pct lead would be superior to 80-10-10; however, consideration of mechanical properties leads to the selection of a higher nickel content, as shown in fig. 1. The addition of nickel increases the yield strength of the antimony bronze, so that with 8 pct nickel, 1 pct antimony, 10 pct lead, values were obtained that were about 70 pct those obtained with the 80-10-10 bronze. Increasing the nickel and antimony still further was effective in raising the tensile strength, but, as mentioned before, was detrimental to the wear resistance.

While this material undoubtedly would find use in applications requiring excellent wear resistance, limitations would be imposed by the sacrifice in yield strength. Consequently, to bolster this weakness, additions of 1 to 5 pct tin were made and the results given in fig. 2 were obtained. The tensile and yield strengths of the nickel alloy increased directly with tin additions up to 5 pct and still maintained excellent wearing properties; however, the ductility became lower. The yield in compression also increased with the tin content. In order to match the yield strength of the 80-10-10 bronze in either tension or compression, approximately 2 pct tin must be added to the 8 pct nickel, 10 pct lead, 1 pct antimony composition. Although the ductility is less, it is sufficient for many bearing applications, since the wear resistance is superior.

The wear resistance of the nickel-antimony-lead bronzes investigated was found to be related to the microstructure. In a good leaded bronze bearing alloy, a uniform distribution of lead is required. Tin has a powerful effect on lead distribution, and in the 80-10-10 alloy it produces a random distribution of chunky particles.

In lead copper alloys, the lead is arranged in a continuous intergranular film, which condition causes high wear. In the 10 pct lead copper alloy, the addition of 2.5 pct nickel breaks up the continuity of the film; and with 1 pct antimony alone, further dispersion of the lead is obtained. When the two metals are added in combination, further change occurs. The lead is more finely dispersed and a new phase appears, which increases with the nickel content. The new phase is probably a copper-nickel-antimony compound containing some lead. The copper-antimony and nickel-antimony systems are somewhat similar in that both copper and nickel retain about 8 pct antimony in solid solution and above this amount form compounds. Apparently the addition of nickel reduces the solubility of antimony in copper and causes the precipitation of the compound. It is also possible that the new phase contains some lead.

The addition of tin results in the formation of finely dispersed theta. This constituent precipitates from solid solution during cooling and is located in the interdendritic areas of high tin content. Apparently this cored structure is the reason for the decrease in ductility.

In order to put this new alloy into practice, it was necessary to determine the effect of some common production variables. Excessive melting temperatures, for example, should be avoided, since superheating promotes the formation of intergranular lead films resulting in poor wear resistance. Castings should be made in green sand or cement-bonded core sand, since chill-cast sections, which have a very fine microstructure, exhibit less wear resistance. Apparently a uniform distribution of comparatively coarse particles is desirable in nickel-antimony-lead bronze for best wear resistance.

Magnetic Method for Diamond Hardness Measurements

DURING the course of research into methods of inspection, an automatic machine has been developed for the rapid (120 per min) hardness inspection of small steel components which are required to have a nominal diamond pyramid hardness number (H_D) of 850 for acceptance. For its operation the machine depends upon the magnetic properties of the steel, H_D being used as referee. It is essentially a method suitable for the nondestructive testing of large quantities of mass-produced components of the same size and chemical composition.

Each sample is hopper-fed into a magnetizing coil where it is magnetized to saturation. The retentivity is measured by means of a search coil situated at the center of a solenoid, the field of which is opposed to that of the original magnetization. The current in this solenoid is the "machine setting," and the milliammeter scale may be used as an arbitrary magnetic hardness scale.

The method is to grade a large representative sample (say 1000 test pieces) by the machine into hardness groups, each group decreasing by two magnetic hardness units. From these groups a few (say, five) samples are selected and H_D determined on each. A correlation can thus be obtained between magnetic hardness (i. e., machine setting) and H_D. The machine setting is observed for the corresponding acceptance figure of H_D, and this setting is used to test the bulk of the factory production by the magnetic hardness testing machine.

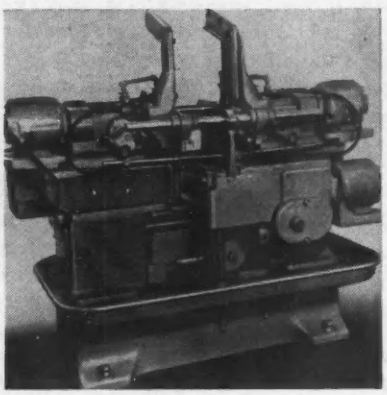
For the application of this method it is important that independent observers should obtain the same H_D results within close limits on identical specimens. Preliminary work showed that this was not the case, and accordingly an investigation was undertaken to examine the capabilities of various observers. The results are contained in a paper entitled "Sources of Error in Diamond Pyramid Hardness Measurements in Hardened Steel," submitted by W. N. Hindley to the Iron & Steel Institute, London. The wide variations obtained are attributed to carelessly prepared flats. A standardized procedure for surface preparation is therefore recommended.

New Equipment . . .

Machine Tools

. . . Various developments of general utility in all types of machine, tools including milling machines, precision lathe, broaching machine, vertical gear grinder, tap grinder, magnetic separator, circular blade grinder, indexing machine, and internal gear shaver are described in this week's digest of manufacturers' announcements.

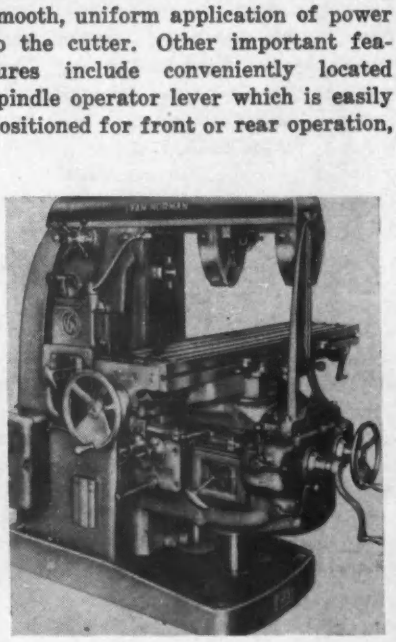
A FULL Automatic Centering Machine, said to be capable of producing accurate, properly centralized and lined-up center holes simultaneously in each end of a piece of stock, has been announced by *Pratt & Whitney, Div. Niles-Bement-Pond Co.*, W.



Hartford. Except for initial setup, the machine can be handled by unskilled labor, as it requires only keeping the magazine supplied with work, taking away centered parts and caring for the ordinary center drills used. Both ends of the work are centered in one operation with drills being fed in conjunction with a full automatic work handling mechanism. The magazine holds the work and allows it to feed down by gravity to the transfer slides. The magazine ways have adjustable guides to accommodate work ranging from ⅜ in. up to 1⅝ in. diam. The magazine may be set to accommodate a range of work varying from a minimum length of 3½ in. to maximum length of 18 in. A crank is provided for conveniently moving the entire mechanism by hand during setting up operation. The machine is equipped with pushbutton control convenient to the operator's right hand. This machine is also equipped with change gear which provide four different camshaft speeds.

Milling Machine

THE No. 2 Heavy Van Norman Milling Machine, designed for a wide range of production and general purpose milling applications, has been announced by *Van Norman Co.*, Springfield 7, Mass. Engineering features have been added to make definite important contributions to faster, easier and more accurate operation. The new column and base is heavier and larger, with scientific internal ribbing to assure solid rigidity for the heavy duty spindle and spindle transmission, as well as the knee. A feature included in the new design is a heavy, large diameter flywheel mounted on the inside of the column assuring smooth, uniform application of power to the cutter. Other important features include conveniently located spindle operator lever which is easily positioned for front or rear operation,



safety devices in the knee to eliminate strain on any unit of the mechanism should any feed overload occur, large diameter feed screw, automatic lubrication, hardened alloy steel gears and shafts and large dials.

Precision Lathe

DESIGNED for use in tool rooms, laboratories and production departments working to extremely close tolerances and finish specifications, a model DV59 Hardinge High Speed Precision Lathe has been announced by *Hardinge Bros., Inc.*, Elmira, N. Y. This lathe incorporates all the features of their precision lathe line, in addition to the following new features: (1) The steel bed ways are of the new improved dovetail design. These ways are hardened and ground to master gages to assure sustained accuracy and precision interchangeability of attachments. (2) The lathe bed has a three-point mounting on the welded steel pedestal base. (3) The fully enclosed headstock has preloaded ball bearing spindle construction. (4) A new compound slide rest is securely anchored to the dovetail bed ways by the patented positive lock. This lock is said to afford rapid positioning of the compound slide rest on the hardened and ground dovetail ways. (5) The ball thrust tailstock spindle has a constant full bearing in the tailstock body regardless of the position in the tailstock body. (6) The welded steel pedestal base fully encloses the driving unit and tool storage compartment.

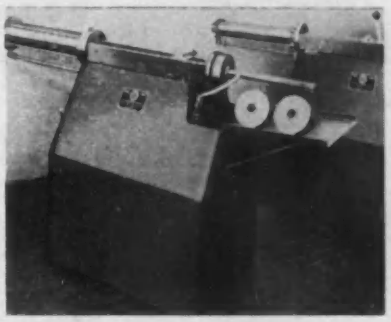
Vertical Gear Grinder

A 26-IN. Universal Hydraulic Vertical Gear Grinder for both spur and helical gears, has been announced by *Pratt & Whitney, Div. Niles-Bement-Pond Co.*, W. Hartford. This machine is capable of handling gears up to a maximum outside diam of 30 in. with a maximum diametrical pitch of 2 and a minimum diametrical pitch of 12. It will handle helix angles, either right or lefthand, up to 35°, and a maximum width of gear face of 10 in. Indexing means are provided for grinding gears with numbers of teeth ranging from 5 to 190 inclusive, except for a few prime numbers above 83. The machine is similar in principle to the well-known 10-in. Gear Grinder in that both pro-

duce involute profiles by rolling the pitch circle of the gear being ground upon an imaginary pitch line. Differing from the horizontal 10-in. machine, the 26-in. Gear Grinder is a vertical machine whose motion most nearly resembles a vertical shaper. It has a vertical work axis, and a vertically moving wheel slide. This arrangement is said to be more convenient for placing large diameter heavy gears in the machine. The greatest difference between the standard 10-in. Grinder and the 26-in. Grinder is in the mechanism used for producing the rolling generating motion of the gear being ground. Instead of the master rack and master gear method, the new machine uses a system of change gears. Various methods of work mounting can be arranged according to the nature of the gear being ground.

Broaching Machine

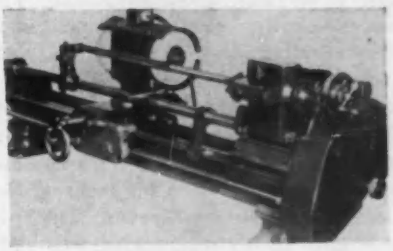
AN improved design of Zager 20-in. Hydraulic Horizontal Broaching Machine, has been announced by *Zager Tool Inc.*, 23880 Lakeland Blvd., Cleveland 17. A noteworthy change is the cutting away of the upper righthand corner of the cabinet to permit broaching larger bars and other stock. The size of the workpiece is limited only by the depth, that is, the distance from the center



of the adapter down to the pan. This distance has been increased to 10 in. The pull is said to have been doubled, from 6000 to 12,000 lb, and the maximum cutting speed is now 20 ft per min.

Tap Grinder

A TAP grinder for sharpening staybolt taps, long taper reamers and other tools requiring relief grinding over long taper surfaces, has been announced by *Edward Blake Co.*, 634 Commonwealth Ave., Newton Centre, Mass. This machine is designated Model No. 4 and is designed so that the side of a small wheel is fed along the taper of long taps, obviating the need of a wide wheel to cover the complete taper in one pass. The standard wheel head and work head from the standard Blake Models No. 1 and No.



2 tap grinders are used. The work head is mounted on a lathe bed and the wheel head is mounted on the lathe carriage cross slide. The controls on the cross slide give longitudinal and cross feed motions to the wheel head. By simply equipping the machine with standard Blake bushings, any taps in the range covered by the standard Blake No. 1 and No. 2 grinder can be sharpened on the chamfer, thus this special machine may be used for standard work at any time. It may also be used for grinding countersinks, the lead on reamers, 3- and 4- flute drills, step drills, and many other tools requiring relief on the point.

Internal Gear Shaver

AN internal gear shaver for automatic transmissions, speed reducers, home appliances and similar mechanisms, has been announced by *National Broach & Machine Co.*, 5600 St. Jean Ave., Detroit 13. The gear shaving process is claimed to produce gears of superior finish and high accuracy. Since compensation for fire distortion and other errors in hardened gears may be made in the shaving process, it frequently removes the necessity of expensive finish grinding or lapping. When lapping is necessary, shaving reduces stock of removal by the operation to a minimum, and thus cuts production time materially. It operates on the proven Crossed Axes Gear Shaving Principle.

A fast simplified loading process and semiautomatic clamping and ejection mechanisms make possible high production with unskilled labor. Other features are easily set automatic feeds and power traverse of the cutter head slide to completely clear the work spindle for loading and unloading. Operator fatigue has been reduced to a minimum.

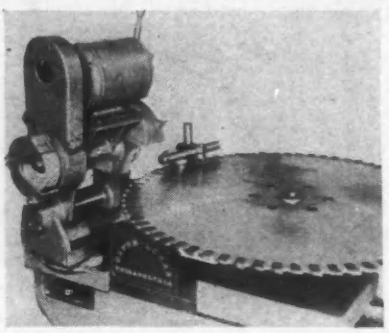
Magnetic Separator

A MAGNETIC separator, Type LDB, for separating parts which come from tumbling barrels mixed with granite, grits, sawdust or other polishing ingredients has been announced by *Stearns Magnetic Mfg. Co.*, Milwaukee 4. The steel parts and stones and polishing compounds are fed into the bulk hopper. The feed from the bulk hopper to the shaker pan feeder is controlled by an adjustable weighted swinging gate to accommodate a uniform feed of either large or small steel parts. The shaker pan feeder feeds the mixed parts in a continuous uniform layer into the magnetic field and underside of the Type LD drum incorporated into the machine. At this point the steel parts are lifted up out of the feed and carried over the drum and

through the demagnetizer by the cleated belt for discharge into a collecting tank. The stones and compounds fall off of the end of the shaker pan feeder into a receptacle. The separator is 134½ in. long, 54½ in. wide and 66 in. high.

Circular Blade Grinder

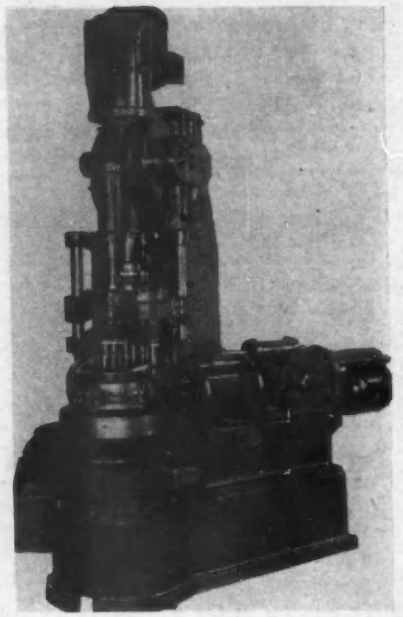
A CIRCULAR saw blade grinder of heavy, rigid construction, for sharpening inserted-tooth metal-cutting saws has been announced by *Espen-Lucas Machine Works*, Front and Girard Ave., Philadelphia 23. The unit is claimed to grind teeth accurately and uniformly to within 0.001 in., and also to maintain proper tooth contour. These features are said to ensure greater saw cutting speeds and to lengthen the intervals between sharpenings. The grinder, model No. 27, has the capacity to handle blades



from 18 in. to 48 in., and can be increased to 60 in. Motor required, ¾ hp, 1800 rpm (approx.) Floor space taken up by this unit is 7 x 15 ft.

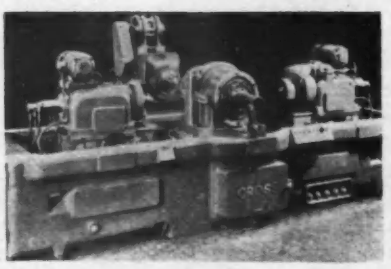
Indexing Machine

THE Millholland No. 5A Automatic Indexing Machine for high production operation of drilling, reaming, milling, spot facing and tapping on automotive parts, domestic appliances and farm implements, or similar parts, where large quantities are manufactured, has been announced by *W. K. Millholland Machinery Co.*, Fairfield and Birchwood Ave., Indianapolis 5. One or more pieces are loaded into the fixtures at each station, depending on the size of work and operations required. Parts can be drilled, reamed, faced and milled or tapped progressively in two planes. The vertical unit is the master unit and controls positive timing of all operations as to feed and indexing, and can be equipped with motor up to 10 hp and side unit up to 3 hp. This machine is arranged so that it is impossible to get out of time. The operator is not required to put his hands near any revolving tools, and loading and unloading is done at point where fixtures are away from revolving tools and with minimum risk to operator involved. Also, the matter of chip removal has been given careful consideration and fixtures are made with channels for leading chips into the chip pan, and a paddle secured to index table carries chips into chip receptacle.



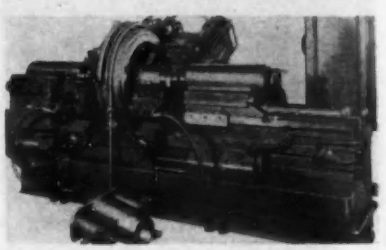
Special Machine

TAPER thread milling (six pitch acme thread), precision boring and precision facing operations are automatically performed on heat treated alloy steel oil tool joints with this Cross Special machine just announced by *The Cross Co.*, Detroit. The machine chucks two joints at opposite ends of a central work-holding fixture with provision for rotating the work in milling the threads. The boring and facing operations are performed simultaneously at the other two stations. Pieces are unloaded and loaded opposite and during the threading cycle. Features include: Power automatic indexing, location and clamping of the work held stationary at stations 1 and 3, automatic work rotation at station 2, rough and finish taper thread milling operation with electric controlled operating cycle arranged for automatic precision resetting of the cutter for the second and finishing cut.



Center Driven Lathes

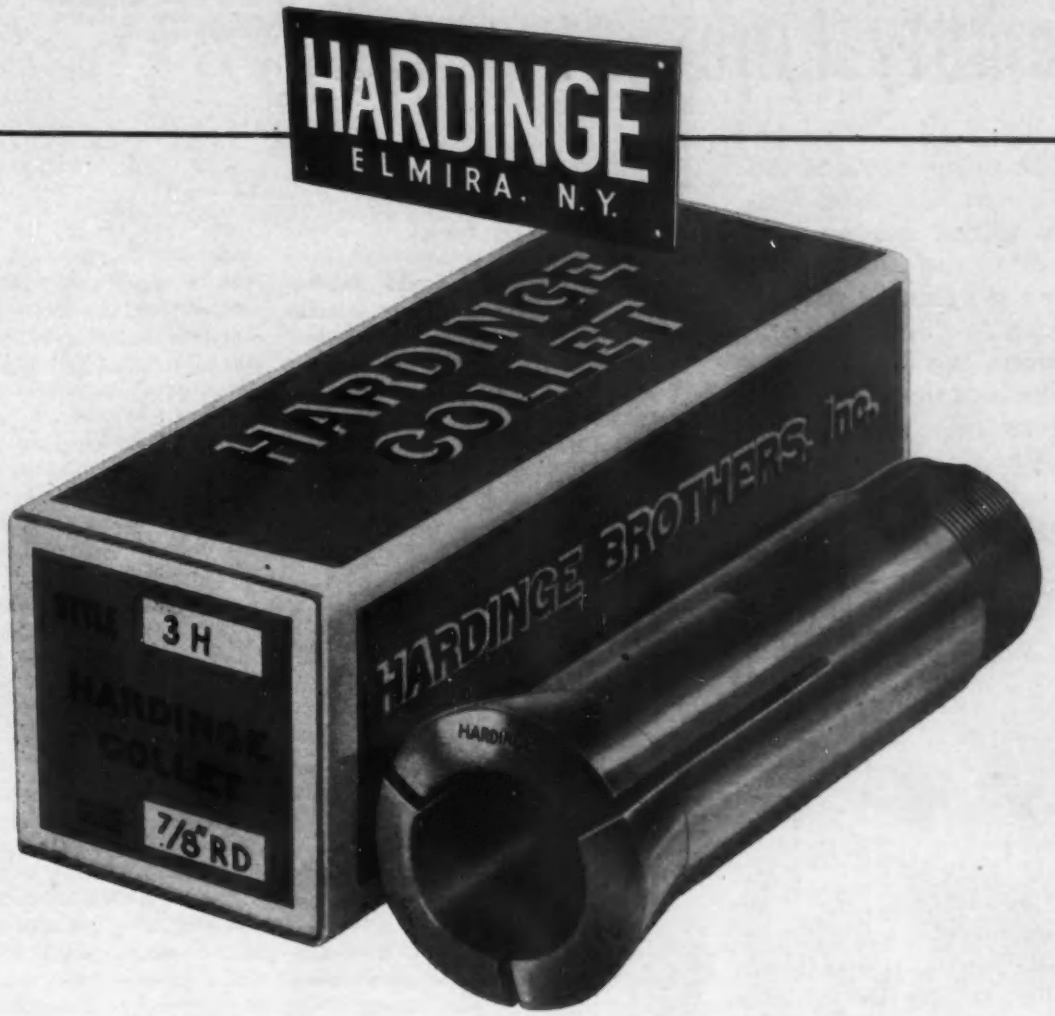
FOUR center driven lathes have been announced by *Snyder Tool & Engineering Co.*, 3400 E. Lafayette, Detroit 7, to combine maximum production and accuracy with minimum handling in processing large heavy parts. One is a prewar machine for processing fabricated steel axle shaft housings for trucks. The second is basically the same, but is built to handle heavier, cast parts. The third machine is built to handle a cast armor plate rotor and designed with considerable travel of the tail stock to provide loading space. The fourth is built for processing cast armor plate recoil housings. All these lathes are hydraulically operated and electrically



controlled and operates on an automatic work cycle. The scope of operations and variety of parts indicate the versatility and flexibility of this type of special-purpose machine. Illustrated is No. 1 machine.

Vertical Drilling Machine

ANOTHER standard machine has been added to the line of vertical drilling machines announced by *LeMaire Tool & Mfg. Co.*, Dearborn. It was designed and built for accurate single or multiple spindle drilling and boring of extra heavy parts, and is identified as model No. 20. It is furnished with a spindle having a milled drive slot for multiple head adaptation, and provision is made for a Morse taper adapter for single operations. Being able to perform three operations without disturbing the original setup, a user can save considerable time and thus increase his production. A manually operated shuttle-type fixture is provided to facilitate the loading and the removal of parts with a hoist. A rigid box-type table 25 x 29 in. max is standard equipment. Power is transmitted by V-belts to a pic-off gear shaft, and through pick-off gears to a worm.



SPECIFY HARDINGE COLLETS FOR ACCURACY AND DURABILITY

When ordering collets only, or when ordering collets with lathes or milling machines of any make or size, specify HARDINGE Precision Collets. Since 1890, HARDINGE collets have been recognized for accuracy and durability.

Write for Bulletin 41 which lists the various standard types, gives engineering data, shows what collets are used in your machines and the attractive prices which apply.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Assembly Line . . . STANLEY H. BRAMS

• The prime issue of the strike in General Motors is not wages, but whether the union shall have a voice in setting prices . . . Some anticipations are for a quick strike, but the better bet favors one of notable length.

DETROIT—at times the lot of the column writer is difficult. There is only one subject to write about this week, but every reader of these pages certainly knows that 102 plants of General Motors Corp. are on strike and probably he realizes that the issue is a difficult one. The columnist, therefore, is obliged to write on subject matter which has been in the headlines throughout the country, and furthermore, must say something different, else he will be considered a copy-cat, a lazy fellow and ultimately he would wind up a victim of the awful fate of having no readers at all.

Fortunately, in their eagerness to cover the news, the reporters of the daily press rarely go into the "why" of any situation. There lies the opportunity for the columnist and the magazines (and, as a matter of fact, that is the only excuse for a magazine's handling news). This, then, becomes a prodigious opportunity to point out that a 30 pct wage raise in General Motors is no more the basic issue than is international control of the atomic bomb. The basic issue is that same old problem of management prerogatives and union intrusions on them. The facts of the matter are that the United Auto Workers Union seeks to condition any pay raise it receives with the assurance that for the life of the award the increase will not be used as a means of obtaining higher product prices. The company refuses to make any deal which would set any kind of precedent giving the union a voice in its product prices. That dispute is where the issues join.

From the union's standpoint higher wages with standardized prices are obviously desirable. From the national standpoint as well they are probably desirable. But higher wages must in the last analysis be derived from higher production, as General Motors has pointed out, and there is no evidence to indicate that worker yield would match a 30 pct worker income. From the company's standpoint there is no intention whatsoever of delivering into the hands of organized labor one of the keystones of the American way of business, pricing by the forces of competition.

It sounds suspiciously like company propaganda to say that this strike is badly timed by the union, because words to that effect are generally uttered during every major strike, and they are generally wrong. This column has never deprecated the strength or ingenuity of labor in the past, and so its observation of bad timing may possess more validity at this moment. Automobile industry production at the time the strike started was below 15,000 cars a week, and there was no sound indication that output would be above 75,000 cars a week by the end of the year—certainly a far cry from output levels indicated by demands. Accordingly, production and sales losses by General Motors to its competition for the balance of this year, viewed against the potential, are negligible. (And "negligible" will be considerable indeed if the current glass workers' strikes continue at Libbey-Owens-Ford and Pittsburgh Plate Glass and shut down the industry entirely in the next few weeks). Beyond that, the tax factors involved establish quite evidently that General Motors is not a financial loser of consequence due to the present enforced idleness. In a word, a strike at this time finds the corporation in a surprisingly ideal position to meet it.

Auto union members, of course, are also in good shape for a strike. They have been working hard through the war, have saved money to see them by the crisis, and most of them are in the current postwar mood of wanting a vacation of sorts. From the workers' standpoint a strike can be better met today than it could in either 1937 or 1939, when G. M. was shut down by walkouts, and sitdowns, but there is no gainsaying the fact that a few thousand dollars in war bonds savings of worker families are no long-term bulwark against a strike-induced stoppage of this kind.

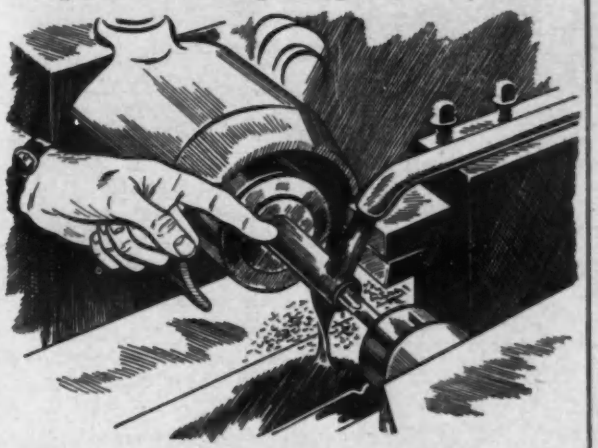
Some rather well-informed observers in Detroit see the possibility that this strike may not go the length generally expected for it; they feel there is a good possibility of a settlement

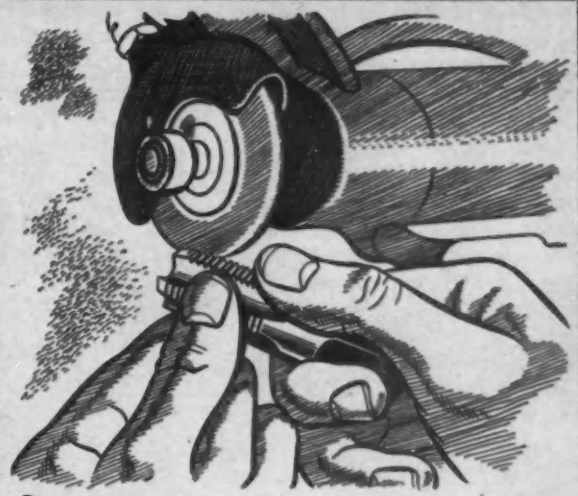
GM PICKET LINE: *A CIO-UAW picket line parades past General Motors Corp.'s Fisher Body plant in Cleveland, as the long-threatened auto strike materializes.*

"GREENFIELD MAN" SOLVES TAPPING PROBLEM FOR NEW JERSEY MACHINE SHOP

[A GTD SHOW-HOW REPORT]

1 This firm was having tapping trouble—cutting torn and oversize threads. A "Greenfield Man" called in, discovered that the turret lathe spindle holding the work was off center causing run-out, and that the nut itself was bronze instead of brass as specified on the original tap order.





2 Having diagnosed the trouble, the "Greenfield Man" had the run-out in the spindle eliminated and himself re-ground one of the taps (a ⅜"-18 Commercial Ground Straight Pipe Tap) with a hook for bronze.

3 He suggested that in re-ordering taps they inform "Greenfield" that the material was hard bronze. He also recommended that they specify 5 lands instead of 4 as the narrower lands would minimize friction. In this way, he insured that they would get maximum tapping performance on this particular job in the future.

4 More than that, the "Greenfield Man" actually showed the operator how to salvage the taps the firm had on hand for this job, simply by grinding off the extra threads on the chamfer and correcting the cutting angle.

Results!

"Greenfield" know-how plus "Greenfield" show-how solved a threading problem that was causing work spoilage and loss of production. The "Greenfield Man" not only found and corrected the trouble on the spot, but he also showed how to get better results in the future by ordering the right tap for the job. Finally, he saved the firm money and delay by showing how to re-grind their stock of taps.

ON THREADING PROBLEMS SIMPLY CALL YOUR "GREENFIELD MAN" THROUGH YOUR "GREENFIELD" DISTRIBUTOR!

in the coming several days. Their ideas are induced not so much by groundless optimism as by the fact—quite apparent on study—that the UAW strategy misfired in calling out its G. M. members at this time. These observers feel that on that account the UAW, having demonstrated its strength will send its people back to work as soon as a face-saving gesture of any sort is made by the company or materializes out of Washington. It must be set down here, however, that a likelihood of this sort is definitely an outside chance. Having been struck, the company is not likely to be in the mood for saving the auto union's face; and in any case, the basic issue of the wage-price principle is one which does not permit much compromising anyway. The face-saving gesture which would evoke a ready return-to-work call by the UAW is very hard to find.

The overwhelming odds, therefore, favor a strike which will extend at least through the end of this year. By that time, General Motors competition will be producing cars in greater volume, and the 1945 tax factor will have evaporated. By that time, also, reserves will have begun to evaporate and somewhat cheerless Christmases will have put steam behind wifely urgings on the rank-and-file to get back on the job. By that time, too, the effect on the national economy will be growing, and Washington will be putting pressure in the direction of a settlement.

Here, therefore, is a freehand prediction, subject as always to the footnote that in labor affairs the diametrically opposite can happen with complete logic: the General Motors strike will continue until about Jan. 19, a Saturday night 60 days from the start of the walkout. The settlement formula will give the workers approximately a 15 pct increase in wages. The condition that price increases based on this pay raise must be withheld will be forgotten. It is all rather depressing.

SAE Text Outlines Characteristics Of Torsional Vibration

• • • In response to a request from the Navy, the SAE War Engineering Board has prepared a report entitled "Evaluation of Effects of Torsional Vibration." This 578 page volume presents the experimental and analytical methods used by research departments of a number of leading diesel engine manufacturers in investigating and applying means of controlling torsional vibrations. The book has now been released for distribution to industry.

The bulk of the book consists of the technical treatise which discusses experimental methods used for measuring torsional vibration, methods for determining and estimating the significance of nominal torsional stresses, and means for reducing those stresses.

The characteristics of well known and conventional torsional vibration measuring equipment are discussed and compared and, in addition, unique types of torsiographs and torsiograph calibrators are thoroughly described and illustrated.

Much attention is given to various short-cut methods that industry has found usable for calculating natural frequencies and for rapidly determining those frequencies experimentally by the use of electrical and mechanical analogies. The distributed mass method of frequency calculation is completely explained.

Attention is given to the prime significance of the relationship between nominal and actual stresses and all of the workable experimental methods for determining stress concentration factors are examined.

The increasingly popular experimental procedure of fatigue testing of full scale parts is explained fully by several companies, with diagrams and photographs of fatigue equipment developed by those companies being included.

The design, construction and application of representative types of torsional vibration dampers are discussed and a very thorough and original treatment of the theory of the pendulum damper with complete design procedure is included.

This text contains numerous photographs, full page drawings, charts and graphs. It is priced at $5.00 to SAE members and $10.00 to nonmembers.

SALVAGE STATION: *Airplanes considered obsolete or damaged beyond repair are stripped of costly equipment for use on other planes. Photo shows an engine being stripped at Naval Air Station, Jacksonville, Fla.*

Lincoln Autos on Way

Detroit

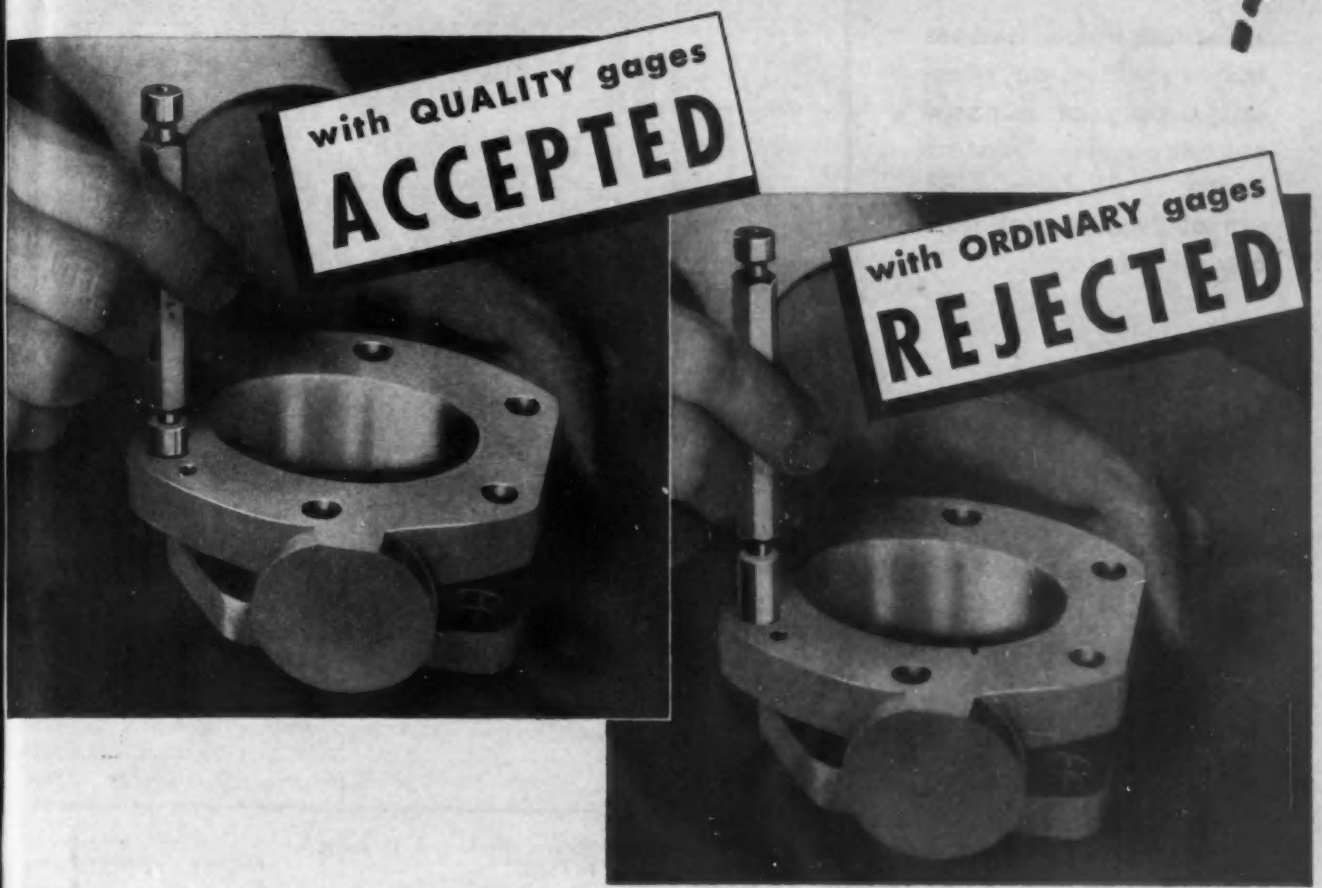
• • • **Lincoln automobiles** are now in production, pointed toward output of 100 units a day shortly after Jan. 1. Cars are being shipped to branches, and a nationwide showing will take place shortly after the first of the year.

Exterior improvements include wider bumpers and new bumper guards, heavier at the top to prevent over-ride and possible damage to fenders and grill. The new grill is a massive die-casting with a quadrated pattern, giving the front a lower, broader appearance.

The standard feature on all 1946 Lincolns is an electrically operated hydraulic mechanism for lowering and raising windows. A button control permits operation of each window individually or all together, as the riders see fit.

IT'S IMPORTANT TO YOU

to consider THIS *Cost Factor!*



Frequently, gage quality alone marks the difference between rejection or acceptance of satisfactory parts . . . between production profit or loss.

In the part illustrated, the holes may be extremely close to, but within, required limits. Using an ordinary new gage, in which usual allowance for wear has been incorporated, the "go" member may indicate the hole to be undersize. In a high quality gage . . . made of wear-resistant material . . . wear allowance is eliminated in its manufacture. It is *accurate* from the *first* inspection . . . and throughout its long, dependable service life. If the hole is actually within specified tolerances, it will be gaged correctly and the results of expensive man-hours and machine time will not be consigned to scrap.

This same initial accuracy in a gage . . . this same accuracy which is retained throughout the life of the gage . . . also provides quality control which consistently permits higher standards of precision in production departments. So, from every standpoint, good business judgment dictates the use of only the *best* gages obtainable. Lincoln Park produces them.

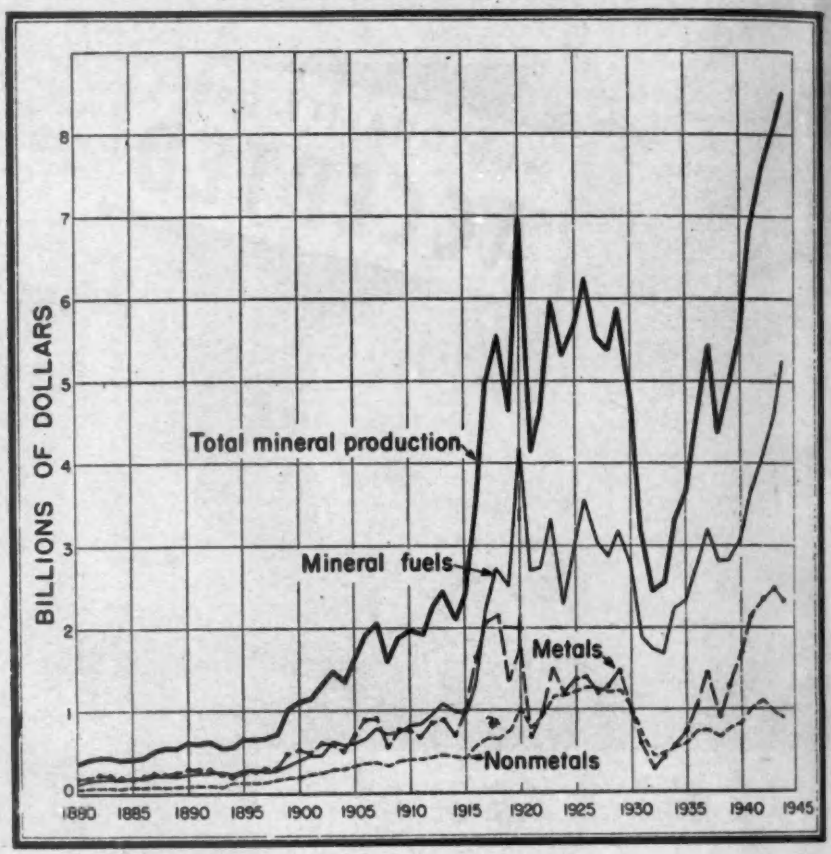
LINCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

1729 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

Washington . . . L. W. MOFFETT

• Reports before Senate subcommittee on present supply of mineral reserves in United States . . . Estimates 68 pct of commercial iron ore still remains.



MINERAL OUTPUT: *Mineral production shown here is in billions of dollars with figures going back to* 1880.

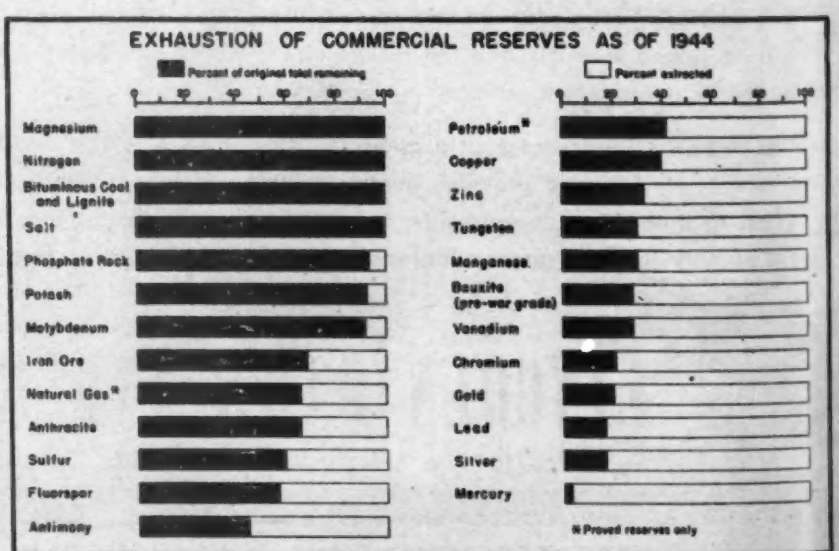
WASHINGTON—Although the mineral resources of the United States were considerably depleted during the war, the fact that we are very well supplied with fuel and iron ore constitutes the principal reason why we are not a "have-not" nation. This was brought out recently in testimony by E. W. Pehrson of the Bureau of Mines before the Senate Military Affairs Surplus Property Subcommittee which is considering stockpiling legislation.

As long as we have coal and iron ore, there is an economic basis for a steel industry, he stated, and with a sound steel industry other raw materials, whether produced domestically or imported, will flow to it.

According to recent estimates by the Bureau of Mines, 68 pct of the original commercial iron ore reserves still remain. It is recognized that the United States is outstanding as a depository of iron ore. Although low-grade deposits of iron ore are scattered throughout the world, deposits in Sweden, Brazil and India are the three most nearly comparable to Lake Superior deposits, according to C. K. Leith of the Office of Production Research and Development.

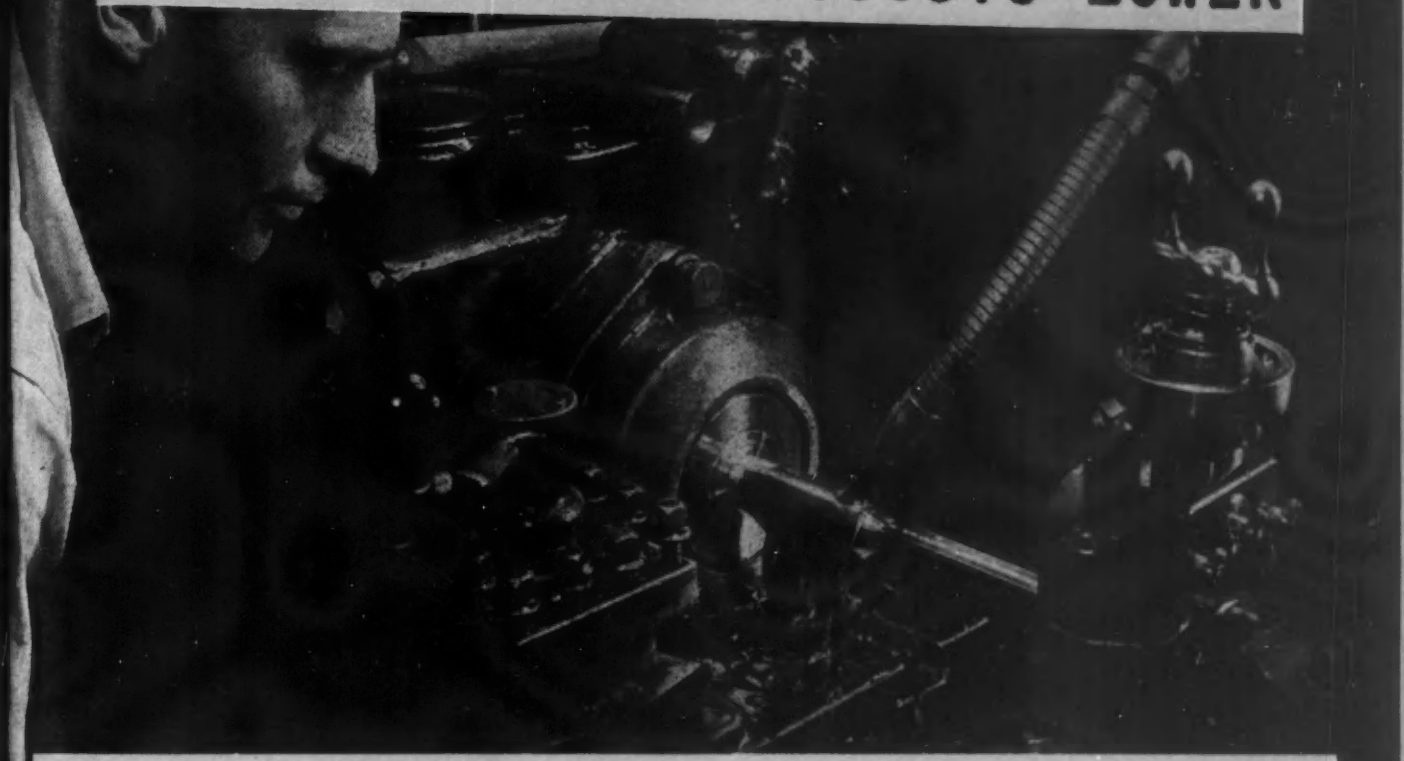
Commenting on the quality of United States reserves, Dr. Leith pointed out that the 68 pct estimate is somewhat misleading inasmuch as it includes ore that is inferior to the standard set for the steel industry. Higher cost lower grade ores make up a considerable portion of the reserve.

Based on the 1935-39 annual rate of use, the Bureau of Mines has estimated that commercial iron ore reserves will last for 111 yr. However, the picture is different from the qualitative standpoint, Dr. Leith stated. The Lake Superior District — the heart of our iron producing areas— has an expected life of around 35 yr. In other words, low-grade ore deposits have been included to make up the estimated 111 yr supply. These supplies mainly from Alabama, are 30 pct as against 50 pct in the Lake Superior region. In using these ores, we will be going to a distinctly lower level of



4 TOOLS LAST AS LONG AS 5

FINISHES BETTER...COSTS LOWER



SUNICUT...

Increases tool life by 25%...improves finishes

Turning . . . threading . . . tapping tough carbon steel, stainless steel and monel metal faster, better and at lower costs. That's the record of a large Pennsylvania shop when it switched to Sunicut.

Increased tool life and better finishes was the aim of the production manager. With Sunicut, he was able to obtain a saving of 25% in tool life, improve finishes on every operation and at the same time eliminated the necessity of various grades of cutting oils.

Outstanding transparency, high heat absorbing and excellent metal wetting qualities of Sunicut make possible longer tool life, finer finishes and increased operator interest. This clear, transparent, sulphurized cutting lubricant has proved its production value in the leading metal working plants of America.

In your plant let Sunicut help you increase the life of cutting tools, improve finishes, and step up production. If you are faced with a metal working problem, remember there's always a Sun Cutting Oil Engineer ready to help you . . . just write

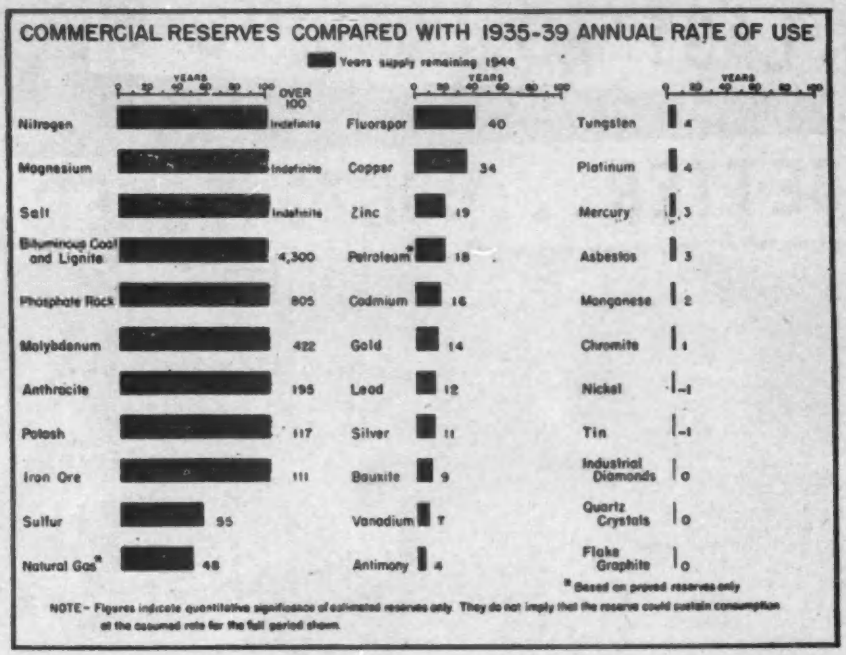
SUN OIL COMPANY • *Philadelphia 3, Pa.*

Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY



supply for our steel industry and, in so doing, will lose the premium advantage which has put us out in first place, he declared.

In further explanation of the estimate, Mr. Pehrson pointed out that it is predicated on ore reserves for which the technology has been proved as of today and for which the commercial feasibility can be anticipated with reasonable safety. The 111 yr estimate, he emphasized, does not in any way deprecate the importance of the fact that we are getting down to the bottom of the barrel on the cream of our iron ore resources. We must make sure that other things are coming along to take their place.

The quantity of submarginal and highly speculative deposits of iron ore has been estimated by the Bureau of Mines at over 500 yr. This figure does not include commercial reserves. United States' self-sufficiency of iron ore measured in terms of the ratio of domestic production to consumption, 1935-39, is estimated at around 95 pct.

With regard to the self-sufficiency of the United States in other metals, Mr. Pehrson stated that we were able to furnish 82 pct of our zinc requirements during the war as compared with 94 pct before hostilities. In lead our self-sufficiency declined from 89 pct to 59 pct during the war. In the case of copper we declined from an export surplus to 66 pct self-sufficiency during the war. Mr. Pehrson declared that within a decade we would probably go on an import basis for copper. We can also anticipate an increased dependence on foreign sources of supply for other important mineral raw materials including zinc, lead, mercury, ferroalloys, tin and nickel. This fact alone, he stated, justifies prompt action on stockpiling legislation.

That there may be some margin of error in estimating quantities to be stockpiled to meet future contingencies, Mr. Pehrson pointed out, is even more reason for development of submarginal sources in the event stockpile preparations do not measure up to the emergency situation.

Some quantity of every mineral used for war purposes in the United States had to be imported, Dr. Alan M. Bateman, RFC minerals consultant, told the committee. Since 1942 up to Aug. 15, 1945, we imported over $2 billion worth of metals and minerals, he declared, of which copper, lead and zinc exceeded 5½ million tons and cost $1.1 billion.

Dr. Bateman also discussed the several outstanding lessons which are to be gained from our war experience of creating stockpiles in periods of emergency. These are (1) prewar stockpiles would have been vastly more effective and less costly; (2) considerable shipping space would have been saved and losses incurred both in ships and cargo due to submarine warfare could have been avoided; (3) manpower and materials required for manufacture of mining equipment and supplies could have been diverted to direct war activities; (4) the hazards of extended supply lines would be eliminated if stockpiles were made available.

The estimated cost of the maximum stockpile recommended is approximately $4 billion, 92 pct of which would be made up of minerals, according to Mr. Pehrson.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THE OLD MAN WANTS ALL THE OLD MACHINES PUT BACK IN THIS OLD SHOP EXACTLY WHERE THEY WERE BEFORE TH' WAR!
THAT'S ABOUT ALL THERE IS IN TH' NEW SHOP, IS THE OLD MACHINES-- WHUT'RE THEY GOIN' TO USE THAT PLACE FOR?
SHOPS WAS ABOUT THE ONLY THING THEY COULD BUILD DURIN TH' WAR, AN' NOW IT LOOKS LIKE WE CAN'T AFFORD TO KEEP UP OUR NEW HOME!
WELL, TH' WAR GIVE US A TASTE OF LUXURY-- NOW IT'LL BE AWFUL TO LEAVE TH' MANSION FOR TH' SHANTY!
11-30
J.R.WILLIAMS
WAR MANSIONS
COPR. 1945 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.

(Advertisement)

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

A technical magazine states that the war-developed arc-oxygen electrode will cut quarter-inch steel plate at the rate of a foot per second while under 40 feet of water. *Metal and Thermit Corp.*

get ready with CONE for tomorrow

It is estimated that within a few years 80% of the coal mined underground will be removed from the mines on conveyor belts instead of in cars. *Scientific American.*

get ready with CONE for tomorrow

The PV-3 helicopter has a long fuselage with a rotor on each end and carries twelve persons. It is being tested by the Coast Guard and Navy. *Popular Science.*

get ready with CONE for tomorrow

A new cement, for use in concrete flooring, is said to drive away insects, kill bacteria, and prevent the formation of molds. It also dissipates static electricity. *H. H. Robertson Co., Pittsburgh.*

get ready with CONE for tomorrow

An appliance manufacturer announces an electric washing machine that can also, by the use of attachments, wash dishes, peel potatoes, churn butter, and freeze ice cream. *Hurley Machine Division Elec. Household Utilities.*

get ready with CONE for tomorrow

A new gasoline-powered lawn mower resembles a floor scrubbing machine. It is mounted on four wheels and uses a rotary knife revolving at 3,000 r.p.m. *Whirlwind Lawn Mower Corp., Milwaukee.*

get ready with CONE for tomorrow

The manufacturer of the jet engine used in the P-80 Shooting Star prophesies that all transcontinental planes will be jet-propelled within five years. *General Electric.*

One of the war devices that may survive to help the motorist is the tire gauge that registers on the dash, developed for the Army's amphibious "duck." *GMC Truck and Coach Div.*

get ready with CONE for tomorrow

A magnetic survey of the state of Florida shows large areas in the southern part that are favorable for the occurrence of petroleum. *U. S. Dept. of Mines.*

get ready with CONE for tomorrow

Meals are being served in the Naval Air Transport Service that are pre-cooked, packed in a covered paper plate and frozen. On the plane they are thawed and heated in a special oven. *Maxon Sky Plate, W. L. Maxon Corp., 460 W. 34th St., New York.*

Air conditioned trolley cars are being introduced in a Southern city. This is said to be the first use of such equipment in city vehicle transportation. *Atlanta, Ga.-Pullman-Standard.*

get ready with CONE for tomorrow

A new household electric light switch can be set for delayed action up to three minutes. *T. J. Mudon Co., 1240 Merchandise Mart, Chicago.*

get ready with CONE for tomorrow

Rubber V-belts molded around a steel cable have been developed to replace chain drive on Army motorcycles. *Goodyear, Akron 16, Ohio, Whizzer Motor Co., Los Angeles.*

get ready with CONE for tomorrow

Even the common wire nail has been improved. The new type has a notch in place of the point and is claimed to be non-splitting. *E. S. Gair, Snyder, New York, inventor.*

West Coast . . .

OSGOOD MURDOCK

• Mills here feverishly operating two and three turns daily with backlogs varying from 45 days to six months, depending on product and facility . . . Labor relations friendly but pensive.

SAN FRANCISCO—"Tighter than at any time during the war" is the way one mill executive describes the current steel situation in this area. Mills are booked through the second quarter on certain items, new customers are having their orders turned back to them, eastern mill representatives are withdrawing from the market on some products and strike votes in a cross-section of heavy manufacturing industry bedevil the entire structure.

Columbia Steel is booked into April on wire products and well into March on sheets. Actually the company has a greater backlog than these dates would indicate, but depending on the customer and the exact type of order new commitments can be slotted into the schedule. Rolling mill products are booked ahead 45 days. In this category too the mill has more orders than the delivery date would indicate, but many are not exactly fixed orders and are subject to some change and adjustment.

Castings at Pittsburg are also booked into December with the foundry back on its prewar balance and its output largely in the railroad casting category. Inquiries for heavy marine castings are, as might be expected, practically at a standstill. The foundry still has a good many of the latter on hand and frozen, but releases would not be too difficult to procure so that the company could obtain their orders out of stock.

Columbia's Pittsburg, Calif., mill is operating 21 turns on their openhearth at between 90 and 93 pct capacity. One postwar advantage the company has picked up is getting the hearths back on the line faster than in wartime. Three or four day jobs used to take two to three weeks, but are now being completed a good deal closer to schedule, enabling the department to work three turns seven days a week.

The rolling mill and wire departments are working 18 turns at Columbia, three turns six days a week, and the foundry two turns five days a week. Foundry men are holding up the level of their take-home pay on a par with workers in the rest of the mill by putting in overtime elsewhere in the plant at the end of the foundry shift. Volume in the latter department is fairly typical of that throughout the Coast foundry business and could be considerably better without taxing capacity.

At Torrance, Columbia is working 17 turns in their sheet mill against a normal of 15 or 16 turns and a maximum of 19. The structural mill is working 11 to 12 turns at a rate of two turns for six days, taking everything the mill can turn out. The bar mill is also working two turns six days a week.

BETHLEHEM Pacific Coast is booked into the second and third quarter on products from eastern as well as on western units. Plates are scheduled well into April, structural shapes into March and wire products into June.

The same conditions prevail at Bethlehem as at Columbia. While schedules are running tight, new orders in some cases can be worked into the schedules depending on what is running so that if a customer is lucky he may be able to get earlier delivery than he might expect.

The Seattle bolt and nut plant, which is just starting its $400,000 expansion program, is in a position to make pretty good delivery.

Kaiser at Fontana is booked into the first quarter on all products. Plates are scheduled into mid-February, thanks to the lifting of WPB regulations, and would probably be booked much further than that but for the overhanging surplus stock in the hands of the RFC which is moving at $10 a ton under the wartime price.

The 36-in. and 29-in. mills at Fontana are working three turns six days, as is the merchant mill. The plant has been working two openhearths since VJ-day and last week lit a third. Company officials expect to put on a fourth soon. With business looking up for the plate mill as orders come in for lots of 10 to 100 tons, indicating to the management that current business is normal and typical of peacetime demand, they are getting ready to put on another crew and have the plate mill working two turns by the end of the year.

ONE leavening influence on Fontana's plate production has been the mounting volume of inquiries for export. The company has inquiries on hand for more than 100,000 tons from this source alone. And parenthetically, for those who have wondered about the accuracy of the postwar estimates on steel consumption made by the Kaiser Co., officials say they are gratified to find that foreign inquiries tally pretty closely category by category with their original estimates.

Fontana's merchant mill is booked into the second quarter and delivery could be obtained on shapes in the first quarter, depending on mill schedules.

Belabored from the right, the left, and seemingly the top and the bottom, the Coast steel industry is mentally standing by until the steel workers strike vote scheduled for Nov. 28 is tabulated. Prognostications on the subject by executives of the interested companies lead to the inconclusive conclusion that the determining factors lie out of the control of Coast industrial and labor leaders in all fields but that of the continuing machinists' strike in the San Francisco Bay region. And in this case, too, some commentators predict that the determinant for its settlement will be the pattern established by the auto and steel workers' action. In other words, whether willfully or not, the West is looking to the East and wondering where the East is looking.

A QUICK catalog of the local labor situation shows the steel mills waiting for the steel workers' vote on a national basis; the Coast foundry business is waiting for the tally of the coastwise strike vote cast last week.

WHAT'S AHEAD FOR YOUR BUSINESS?

Find Out How EX-CELL-O'S Complete Parts Production Facilities Can Help You!

With a complete organization under one responsible management . . . *an organization built upon years of varied engineering experience, modern machining methods and heat treat facilities, and practical inspection staffs* . . . Ex-Cell-O probably has the exact solution to the parts production problem you face. Ex-Cell-O field engineering representatives will be very glad to sit down and talk it over with you.

Above: Sectional view of Ex-Cell-O precision boring department for miscellaneous production parts.

EX-CELL-O CORPORATION
DETROIT 6, MICH.

SEE EX-CELL-O FIRST

XLO
EX-CELL-O for PRECISION

EX-CELL-O's *facilities:*

PRODUCTION ENGINEERING

The Ex-Cell-O organization, with skills, facilities and modern methods that have made a wartime record, can make an important contribution in the planning of quantity production of quality parts and unit assemblies for your postwar product.

HEAT TREAT

Induction Hardening
Laboratory for Heat Treat Control Including Micro Examination and Photography
Atmosphere Control Continuous Hardening Furnaces
Atmosphere Control Box Hardening Furnaces
Various Types of Air-Draw Batch Type Furnaces
Gas Carburizing Furnaces
Box Carburizing Furnaces
Pack Annealing Furnaces
Nitriding Furnaces
Cyanide, Lead, and Neutral Salt Pot Furnaces
High Speed Steel Atmosphere Control Vertical and Horizontal Hardening Furnaces
Continuous Air-Draw Furnaces
Cab-Zero Heat Treating Equipment

PRODUCTION MACHINES

Multiple Vertical Turret Lathes
Multiple Spindle Automatic Screw Machines
Single Spindle Automatic Screw Machines
Hand Screw Machines
Cam-Type Grinders
Single and Multiple Spindle Drilling Equipment
Plain O.D. Grinders
Plain I.D. Grinders
Milling Machines
Broaching Machines
Precision Thread Grinders
Precision Boring Machines
Lapping Machines
Special High Production Equipment

UNIT ASSEMBLIES

For many years Ex-Cell-O has supplied large and small manufacturers with parts and has also supplied many parts in unit assemblies after machining, heat treating and grinding.

INSPECTION

Ex-Cell-O has always maintained that quality in a product is not the result of accident; that quality is built into a product by rigid adherence to accepted quality standards . . . standards that are upheld at Ex-Cell-O by efficient inspection at every step of the machining process.

Pending this count negotiations were suspended at the request of the employing foundrymen. Industry representatives express themselves as "surprised at the friendly feeling which characterized the (last) meetings." They retain some degree of skepticism, however, feeling that regardless of the outcome of the Seattle count of the strike vote, subsequent action may be dictated largely by the well headlined outcome of the two forthcoming national strike votes.

The amicable settlement of the requests of the Bay area structural steel shopworkers was somewhat of a pyrrhic victory. Despite the fact that the settlement was acceptable to both sides, it was negotiated during a period when the fabricating shops were closed up tight by the local machinist strike and these shops are still closed. One difficulty in the entire machinist imbroglio is the fact that the demands of the union are commonly described as "a 30 pct wage increase." Fact is that it could just as easily be described as a 48 pct increase. The popular designation blithely overlooks the fact that the demands also include nine days of holidays, sick leave, vacations and inflexible provisions for the payment of $1.85 per hr instead of the generally accepted $1.65 per hr for new work under certain conditions. These minor items raise the total increase which the machinists are demanding to a figure which might be as fairly described as a 48 pct wage increase. This aspect of the negotiations is being kept within the confines of the arbitration chamber, however, and the public—which in the long run is supposed to be the decisive factor in such affairs—has only a partial picture of the full extent of the union demands.

Steel warehousemen in the area have settled their problems in the labor field with a degree of amity similar to that of the fabricators. In this industry the employers deal with two unions, one of which has settled with the maintenance of the old differential above that of regular warehousemen. Original demands were for an increase of 22½ pct and were compromised at a wage rate of $1.075, the equivalent of a 16 pct increase. Included in the contract was a proviso like that of the structural men, allowing the union to reopen negotiations if their increase fell below the pattern established by other industries. The general reaction is that this is an eminently sensible arrangement providing no larger union obtains a more gratuitous increase, but that notwithstanding its advantages it suffers from the loss of local autonomy.

Labor-industry negotiations—with the exception of the machinist craft—are generally characterized as "good, and amicable," but it is apparent that a general attitude of "waiting for something to happen" prevails.

Condemns New Policy To Put Costs Up And To Hold Prices Down

Cleveland

• • • Management can pay workers as much for 40 hrs' work as they have been receiving for 48 hr only if the workers produce as much in 40 hr as they used to produce in 48.

Our new economic policy, which will lead to stagnation, is to put costs up and to hold prices down. In reality, the key proposal in this new policy is that pay increases should be taken out of profits.

These are the conclusion of Brig. Gen. Leonard P. Ayres, well-known economist and a vice-president of the Cleveland Trust Co., in an appraisal of the economic factors underlying the present wage increase debate, in his monthly business bulletin. Other statements from Gen. Ayres' bulletin follow:

"President Truman, in his presentation of the new policy, said that management and labor must determine from time to time to what extent costs have been reduced and profits have been increased, and how far these can properly be passed along in wages.

"This appears to imply that agreements would be worked out between management and labor by which rather constant and restricted amounts of any profits which might be earned would be allocated to the company for reserves and dividends, and the rest would be passed on to labor as wage increases.

"There are three nearly insuperable objections to this in a free, competitive economy: First, it would greatly restrict the volume of earnings that could be retained by the company in years of good earnings and plowed back into the company in the form of expansions and betterments. But that is the chief way by which American industry has financed its expansions during its entire existence and it is almost the only possible way for young companies to grow.

"Second, if earnings above restricted amounts had to be turned back into wages, there would be almost no new venture capital. That would bring disaster, because it is venture capital which creates new jobs.

"Finally, if the proposed procedure went into effect, it would stifle competition, because management would be little tempted to strive to cut production costs in order to increase volume of sales and thereby increase profits."

SURPLUS MATERIAL: *Part of the thousands of Flying Fortresses and Liberators that have been declared surplus and are awaiting salvage operations at the Walnut Ridge, Ark., RFC disposal depot.*

Streamlined for Action!

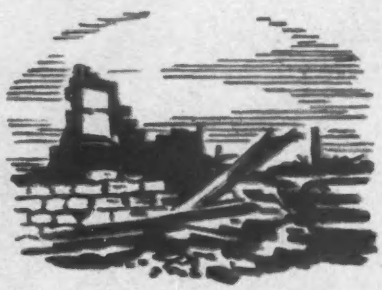
Fire engines of the future, so designers tell us, will be ultra-modern in design and efficiency, incorporating many new features. Aluminum and magnesium will play a vital part in many of the post-war designs now on drawing boards throughout America. Their use eliminates weight—reduces operating costs—and adds greatly to eye and sales appeal. If your product now uses—or can use—these versatile light alloys, the Bohn Engineering staff would like to discuss with you their many outstanding advantages.

BOHN ALUMINUM AND BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT 26, MICHIGAN
Designers and Fabricators
ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

European Letter . . .

JACK R. HIGHT

• British export drive preceding larger food rations . . . "Invisible" exports prime factor in readjustment . . . Labor landslides continue in by-elections indicating retention of controls.



LONDON — Probably among the most familiar words in Britain today are "exports" and "bankruptcy," referring respectively to the nation's greatest need and its greatest fear. Thus the recently halted dockers' strike caused more dismay when it was disclosed in the press that exports for the world were being held up on the wharves and in the factories than it did when British Army stevedores had to be called upon to unload foodstuffs.

This feeling is probably more understandable when it is realized that Britain is deliberately choosing to live on reduced rations, rather than to further endanger her already serious financial situation. Thus, as production controls are maintained here, they are used as a key tool in the official drive to expand exports. The urgency of that drive is emphasized to the ordinary citizen at every opportunity, so that when permission is given to commence manufacture of autos or some other war-lost product, with the specification that 50 pct of the production must go to the export trade, he looks with favor upon the decision.

Word that the first substantial shiploads of dyes, cutlery, knitting needles, pocket knives and pillowcases from England have arrived in Australia, is front-page news in London. Plans for the delivery of 10,000 railroad coaches to France before the end of the year are also of prime importance. Demands for the end of the heavy purchase tax on automobiles were met with direction from the government to the industry to "expand your export markets," i. e. where the purchase tax does not apply.

An average of 20,000 applications for export licenses are being received by the government here every week, despite the fact that due to relaxations an increasing number of products do not need licenses. The average for the past six months is between 15,000 and 20,000. From a start in June, the European trade has developed rapidly, principally in the lines of textiles and all manufactured articles. Negotiations for trade have recently been completed opening the Finnish market, and similar arrangements for Norway are in process. Summarized, industrialists can obtain export licenses for trade as follows:-

Belgium, Denmark, Holland, Luxembourg and Finland: Everything except foodstuffs, coal, hides and leather.

France: Spare parts for all types of machinery and equipment; manufactured products in quantities of less than five tons and of less than $20,000 value. Machine tools, milk cans, coal mining machinery, trucks and leather are excluded.

Greece and Italy: All goods except basic relief materials which are being distributed by relief agencies.

Poland and Yugoslavia: No trade going on at present.

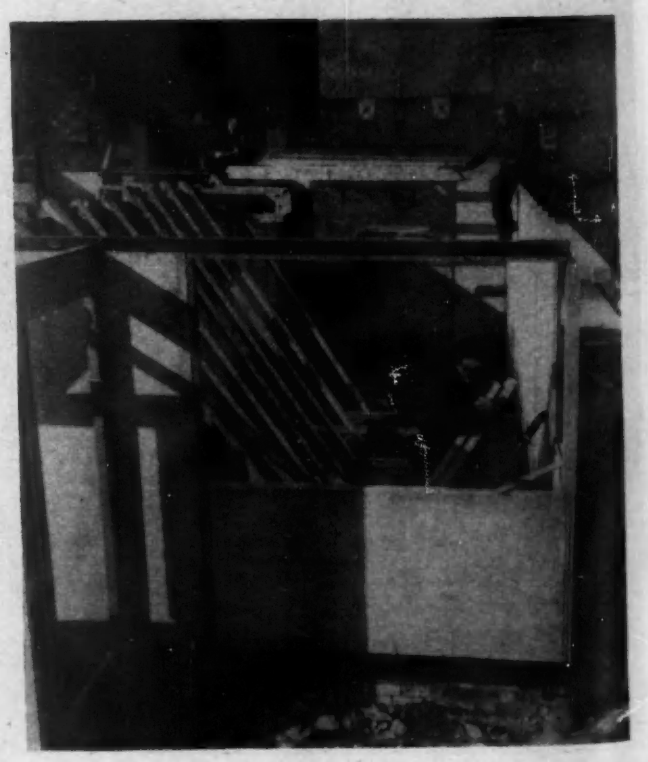
Czechoslovakia: Negotiations for a trade agreement expected to come to a successful conclusion in the near future.

Attention is also being focused on the redevelopment of what is known here as "invisible exports;" that is funds brought in through the sale of services, rather than goods. For example, American goods which were shipped overseas in British bottoms in prewar days constituted an invisible export. Vast industrial organizations in other lands owned by British firms constituted another. The sale of many such firms early in the war to pay for wartime expenditures contributed to the national economic crisis which Britain is now facing.

* * *

THE plan for nationalization of the British air transport system announced recently was of more interest than might be imagined, because the system constitutes another

o o o



EMERGENCY SHELTER: *Erection of thousands of Uniseco shelters is the only part of the British housing program that is going to the satisfaction of the public. They are temporary shelters, not designed for anything but a stopgap to the problem*

o o o

FOR SAFE FOOTING USE JAL-TREAD

FOR ALL FLOOR-PLATE APPLICATIONS

You follow in the footsteps of Uncle Sam when you specify this new and improved rolled-steel floor-plate, for the Army, Navy and Maritime Commission have used it widely. Where the safety factor of sure, non-slip footing is needed to support heavy industrial traffic, maritime loads, or the moving public, it is the ideal installation.

Designed to offer maximum friction surfaces at point of contact, **JAL-TREAD** and **Junior JAL-TREAD** checker floor plates are easy to cut, weld, bend and install . . . present a pleasing appearance . . . are easy to keep clean. Available in wide range of sizes and weights.

For delivery information, consult your local J&L office or favorite warehouse. Illustrated booklet gladly sent on request.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

important potential source of invisible exports. The plan came as a surprise in some quarters, as a previous program brought forth by the coalition government had called for a partnership of private industry and government, and many sources thought that an already busy Labor Government would be content with it.

In an interesting compromise logic the new plan embodies, according to the government, the "rivalry" of three separate government corporations, each operating in a different sphere, without the dangers of "scrambling competition." The three corporations will include the existing British Overseas Airways Corp. for the British Commonwealth, North American, and Far Eastern services, a company to operate domestic and European services, and another for South American services. Until such time as the new companies can be established, Lord Winster, the Minister of Civil Aviation is asking B.O.A.C. to establish services to South America and Europe, and is asking the existing internal air lines to continue their services. Current estimates here are that at least a year will be required to draw up the required legislation and to get it through Parliament.

Under the Coalition plan, now scrapped, the surface transport facilities, railways, shipping companies and travel agencies were to participate financially in the establishment of air transport, and it was thus hoped to utilize their experience, as well as to thoroughly integrate schedules for all services. The new plan calls on the same companies for their cooperation without any participation, financial or otherwise.

Despite the inevitable wrangling with the opposition in Parliament as to the details of the working of the new plan, there seems to be an unwillingness on the part of many to accept the fact that the new government is ready to proceed with the nationalization of Britain's basic industries. The opposition's most trenchant attack on the new air policy is embodied in the phrase "nationalization for its own sake." In the upper house, Lord Strabolgi closed the opening session at which the plan was announced and bitterly attacked with the following statement:- "Labor's policy has long been known, and the present scheme (for air transport) shows little departure from it."

* * *

ORDERS have been placed for over 100 two-engine medium range airplanes for both B.O.A.C. and the Railway Air Services (operating domestic lines). Deliveries are said to have started and are to be speeded up in the next months. All services as specified by the government are to be in operation within a year. Two prospective operators have made inquiries about the possibilities of acquiring American long-range planes to inaugurate services.

* * *

Shipbuilders are also making their contributions to the export drive, with recent orders for seven fast motor cargo ships, four for Dutch owners and three for French, plus a cargo steamer for India adding to the already heavy load of orders now on the books.

* * *

MEANWHILE, continued Labor landslides in by-elections (notably the London Council) indicate that present plans to maintain materials, manpower and production controls are being supported. Current Labor plans include the step that many American manufacturers are using every device to forestall, the entry of labor into the active management of business. The establishment of tri-partite "working parties" in main export industries indicate the plan.

Made up of members from management, labor and the public (in the national interest), they will not only advance plans for expanding exports, but will also chart the renovation of each industry, drawing up plans to improve organization, production and distributing methods.

Surplus War Plant Sales Being Rushed By Canadian Agency

Ottawa

* * * Canada is continuing to dispose of its surplus war plants and to date has sold 18 plants which cost the government some $20,000,000 for approximately $7,700,000, while five other plants are under negotiation for sale. Included in the plants to be sold are: York Arsenals on Weston Road, Toronto; Victory Aircraft, Malton; Crumlin Airport, London, Ont.; Border Cities Industries, Windsor and Otis Fensom Elevator plant at Hamilton. It also is stated that parts of the General Engineering plant at Scarboro, Toronto, and the Small Arms plant at Long Branch, Toronto, may be available for rent soon. The Canadian Associated Aircraft plant at St. Hubert, Montreal, Que., will not be sold but will become a permanent Navy establishment.

The Leaside, Ont., plant of Research Enterprises Ltd., will pass from government ownership to private enterprise in April or May next, to carry on operations somewhat similar to those for which it was constructed by the government, and will employ about 3000 workers, Reconstruction Minister Howe, announced in the House of Commons. The plans for the changeover have been ready for some months and the new owner has been picked, but Mr. Howe would not disclose the name. The optical glass portion of the plant already has been sold to the Corning Glass Co., of Corning, N. Y., while the remainder of the plant which comes under the new deal, including the Radar div., is still engaged in completion of $30,000,000 in war contracts, which will keep it going until next spring.

In addition to plants sold and previously reported in THE IRON AGE, the following have been sold:

.....Dominion Engineering Works Ltd., has purchased the Marine Building addition to its plant (Building No. 17 at Lachine, Que.) plus machine tools and equipment at Lachine and Longueuil, for $750,000.

Canadian Locomotive Co., Kingston, has purchased the three Crown-owned buildings known as "A", "B" and "C", plus machinery and equipment for $359,000.

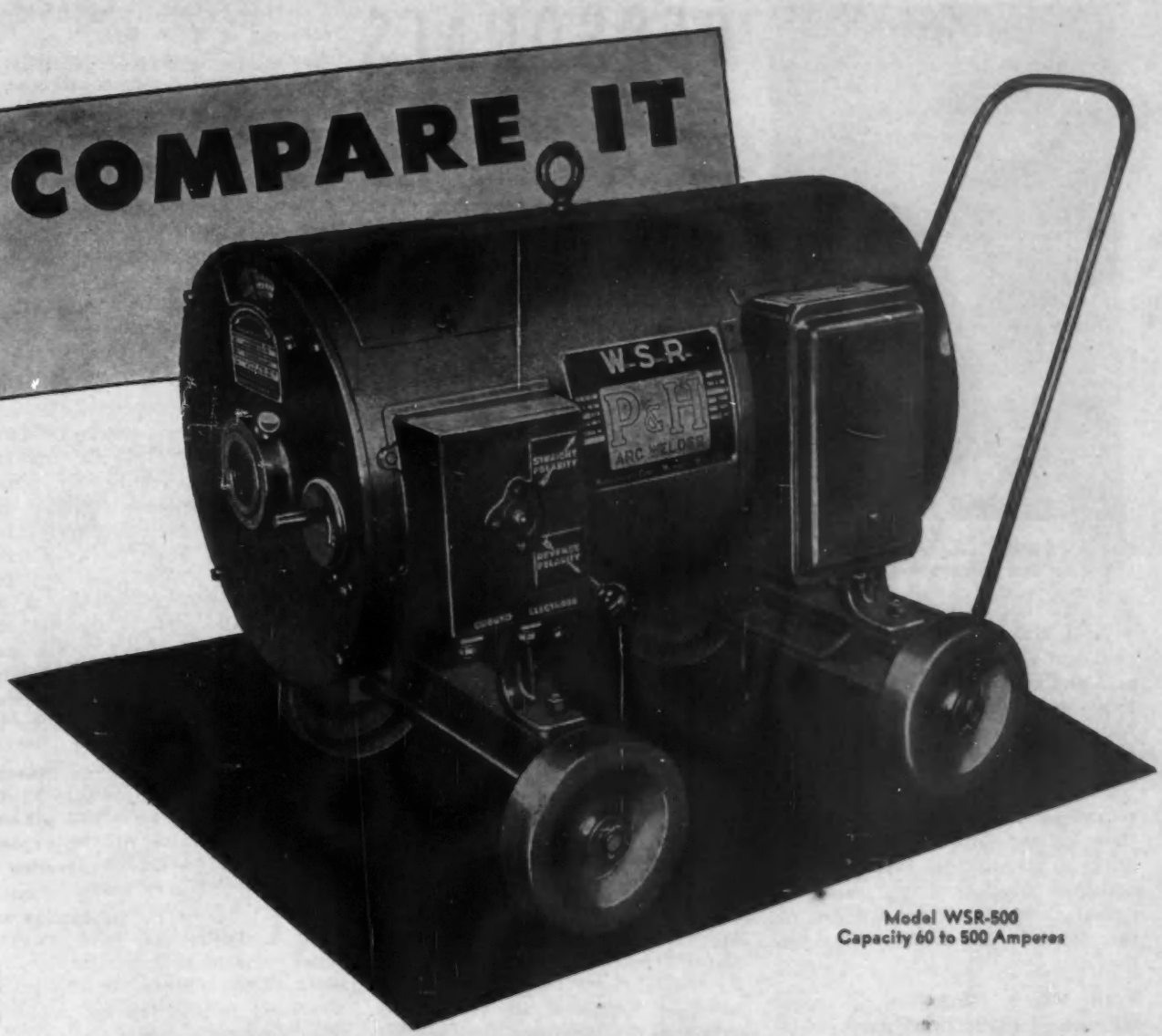
British Aeroplane Engines Ltd., or Canadian Wright Ltd., has purchased buildings and equipment at Sea Island, Vancouver, B. C., for $95,094.

MacDonald Bros. Aircraft Ltd., Winnipeg, Man., has purchased land and buildings adjacent to its plant on Robinson St., for $25,000.

Cresswell Roll Forming Co., Montreal, subsidiary of Pomeroy Ltd., has purchased land, plant and equipment adjacent to the Pomeroy plant for $68,000.

Corporation of Smiths Falls, Ont., has purchased the North End plant of Frost & Wood Ltd., plus electrical equipment and fixtures for $12,000.

COMPARE IT



Model WSR-500
Capacity 60 to 500 Amperes

. . . FOR DOWNRIGHT VALUE!

No matter how you look at this P&H WSR-500 Welder—it spells *value!* Value from its more liberal use of copper . . . its ample capacity . . . its ability to handle larger electrodes to cut the cost of depositing weld metal.

- SINGLE HEAT CONTROL — one simple adjustment for any desired welding current. The operator can't be confused. Arc response is automatic on all types of work — with all classes of electrodes.
- SIMPLIFIED DESIGN—only *two* major parts, a rigid one-piece frame and husky rotating member.
- WSR (WELDING SERVICE RANGE) RATING—certifying the exact usable welding current of each machine from minimum to maximum capacity. You know your cost per ampere.
- VISI-MATIC CALIBRATION—enables you to select instantly the correct current for each of the three classes of electrodes.

Write *today* for information on the Model WSR-500. P&H also manufactures a complete line of welding electrodes for all production and maintenance welding.

General Offices: 4401 W. National Ave., Milwaukee 14, Wis.

A COMPLETE ARC WELDING SERVICE

DC Welders | AC Welders | Welding Electrodes | Welding Positioners | Welding Control Systems | Electric Hoists

P&H ARC WELDERS

HARNISCHFEGER CORPORATION

WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

PERSONALS

S. D. MAHAN, vice-president Crosley Corp., and general sales manager Mfg. Div.

• **S. D. Mahan** has been named vice-president of the Crosley Corp., Cincinnati, and general sales manager of the Mfg. Div. Under Mr. Mahan's direction will come all commercial activities, including export and domestic sales, advertising and service.

• **Andrew VanBeek**, manager of the Hercules-operated Radford ordnance works in Virginia, has been appointed assistant director of purchases for Hercules Powder Co., Wilmington, Del. He will assume his new duties Dec. 1.

• **Dr. Milo N. Mickelson** has joined the staff of the Midwest Research Institute, Kansas City. He was formerly associated as professor of bacteriology and biochemistry at the University of Michigan. His work will be in the field of cell metabolism and microbial fermentation. He served previously in the research depts. of a number of industrial organizations.

• **Donald L. Schwartz** has joined Carboloy Co., Inc. of Detroit in the capacity of research metallurgist. He was formerly superintendent of the metallurgical laboratory until 2 yr ago when he undertook war research work at the metallurgical laboratory at the University of Chicago.

• **George W. Hartner** has been made sales promotion and advertising manager of National Electric Products Corp., Pittsburgh.

• **William Wiseman** has been appointed chief engineer of the Aircraft Div. of Continental Motors Corp. at Muskegon, Mich. He comes from Warner Aircraft Co., where he was chief engineer.

° ° °

• **Howard M. Cutshaw** has been appointed assistant sales manager and **Thomas A. Marsh**, manager of corporation sales of the Iron Fireman Mfg. Co., Cleveland.

• **William A. Johnson** has been named director of sales for the Surplus Property Div. of Reconstruction Finance Corp. in the Cleveland reserve district. He was for many years associated with B. F. Goodrich Co., later organized and headed the Associated Manufacturers, Inc., and has recently been a WPB official.

• **George W. Miller**, formerly assigned to tooling work at the Nash-Kelvinator Propeller Div., has been appointed chief metallurgist for Deepfreeze Div., Motor Products Corp., Detroit.

• **Earle S. Alexander**, sales manager at the Houston branch of Ford Motor Co., Dearborn, Mich., has been promoted to assistant manager of the branch, succeeding **Howard P. Kuhlman**, resigned.

• **George K. Bradfield, Jr.**, has been appointed an assistant vice-president of American Car & Foundry Co., New York. In his new capacity he will assist E. D. Campbell, vice-president in charge of engineering. Mr. Bradfield joined the company in 1933.

GEORGE K. BRADFIELD, JR., assistant vice-president, American Car & Foundry Co.

• **James A. Cain**, formerly assistant manager of A. M. Byers Co.'s Pittsburgh Div., has been appointed manager of a new divisional office established at Atlanta to serve a five-state area. Mr. Cain has been associated with the Byers organization since 1942. He started as a field service engineer, and since May 1, 1944, has been assistant division manager of the Pittsburgh Div., in which capacity he was responsible for the southern territory that is now included in the new Atlanta Div., which will include Georgia, North and South Carolina, Florida, Alabama and parts of Tennessee.

• **Richard R. Ramsay** has been appointed to the Janitrol space heating sales organization of Surface Combustion Corp., Toledo. His territory is to be assigned later.

• **Louis S. Cates**, president of Phelps Dodge Corp., New York, has been elected president of the American Institute of Mining and Metallurgical Engineers for 1946. **Halcombe J. Brown**, consulting engineer of West Newton, Mass., and **Erle V. Daveler**, vice-president of the American Zinc, Lead & Smelting Co., New York, have been elected vice-presidents and directors. Mr. Cates will be formally inducted into office at the annual meeting in February 1946.

• **C. N. Phillips** has been appointed superintendent of Sterling Alloys, Inc. plant, Woburn, Mass. Mr. Phillips has also been recently elected a director of the company.

• **Palen Flagler** has been named director of advertising and publicity of the De Laval Steam Turbine Co., Trenton, N. J. Mr. Flagler was recently with the Bendix Aviation Corp., Philadelphia Div.

• **Maj. Milton Levenson**, who has been assistant director of materials in charge of ferrous and nonferrous scrap for the Surplus Property Administration, has resigned to become associated with Erman-Howell & Co., Inc., Chicago. Before being commissioned in the Army, Maj. Levenson was president of the Roxbury Iron & Metal Co., Inc., Boston.

• **Frank W. Jones** has been named to head the Light Metal Products Div. of Northrop Aircraft, Inc., Hawthorne, Calif. He had formerly been assistant to the president of Leighton Industries and sales executive for the Wyandotte Chemicals Co. prior to entering the Navy in 1943.

• **Charles H. Jennings**, internationally-known arc welding expert and director of all welding research for the past 9 yr, has been appointed engineering manager of the welding dept. in the Motor Div. of the Westinghouse Electric Corp., Pittsburgh. **John H. Blankenbuehler** has been made manager of arc welding apparatus, while **E. Hill Turnock, Jr.** has been made manager of arc welding electrodes.

• **T. J. Kauer** has been appointed managing director of the Wire Reinforcement Institute, Washington, D.C. He has also been named secretary and treasurer of the organization. Mr. Kauer comes to his new position from that of assistant managing director of the American Concrete Pipe Assn.

• **V. G. Scott** has been appointed manager of sales of the Wood Shovel & Tool Co., Piqua, Ohio. He succeeds N. T. Jacobs who died recently. Previous to this appointment, Mr. Scott was production manager, having been appointed to that position in December 1944. He joined the Wood organization in January 1942 as assistant manager of sales.

• **John D. Clark** has been appointed assistant traffic director of the Chicago Assn. of Commerce. For 18 yr he was associated with the Norfolk & Western Railway and managed the traffic bureau of the Youngstown, Ohio, Chamber of Commerce from August 1943 to March 1945. Since that date he has been commerce counsel for the American Trucking Assn.

• **John J. Heffernan**, manager of the E. I. du Pont de Nemours & Co.'s explosives dept's branch office at Joplin, Mo., will retire Dec. 1. **Robert O. Cash**, assistant manager at Joplin since July, will become manager. **Edmund T. Lednum**, manager of the explosives dept.'s branch office in Chicago, will also retire as of Dec. 1. **Gilbert H. Smith**, who has been assistant to Mr. Lednum at Chicago, will become manager of that office.

• **J. Wesley Wittig** of the National Enameling & Stamping Co., Milwaukee, sales staff, has been appointed district sales manager in charge of the firm's newly established office at Atlanta.

• **John P. Mullen** has resigned as educational director of the Gray Iron Founders' Society, a post he has held since July 1943.

• **Thomas G. Daley** has been appointed by the Dodge Div. of Chrysler Corp. as regional manager in the Cincinnati area. Mr. Daley has heretofore been manager of the company in the Philadelphia area and has been with the Dodge organization for 10 yr.

• **Charles M. Sutlive** has been appointed southeastern representative of Pittsburgh Screw & Bolt Corp., Pittsburgh, with headquarters in Savannah, Ga. Mr. Sutlive will act in a sales capacity in Georgia, Florida, Alabama, North Carolina and South Carolina. Recently discharged from the U. S. Navy, Mr. Sutlive has had considerable experience in industry and in engineering. He was affiliated with the City Engineering Office in Savannah and with the Southern States Iron Roofing Co. at Savannah.

• **Chester V. Nass** has been elected to the office of vice-president of Pettibone Mulliken Corp., Chicago. Mr. Nass joined Pettibone as manager of the Foundry Div. in 1942 after 14 yr association with Fairbanks, Morse & Co.

• **Joseph B. Patton**, for 24 yr associated with the Carnegie-Illinois Steel Corp., has been named manager of industrial relations for the Oliver Iron & Steel Corp., Pittsburgh. Mr. Patton was in the industrial relations dept. of the Carnegie-Illinois Corp.'s plants in Vandergrift, his previous experience having been with the Union Pacific Railroad and the American Ever-ready Battery Co.

JOSEPH B. PATTON, manager of industrial relations, Oliver Iron & Steel Corp.

ALBERT H. CHARLTON, sales manager, Aluminum Div., Reynolds Metals Co.

• **Albert H. Charlton** has been named sales manager of the Aluminum Div. of the Reynolds Metals Co., with headquarters in Louisville. Mr. Charlton joined Reynolds in 1936 and was assigned to the company's sheet mills in Louisville. Later he became an assistant plant manager. At the time of his present appointment, he was eastern sales manager for the Aluminum Div., with headquarters in New York.

• **E. A. Canning**, director of sales and engineering, will supervise operations at the Allison-Bedford Foundry, Bedford, Ind., recently purchased by the Allison Div. of General Motors Corp. from ETC. The Bedford Foundry was operated during the war by Delco-Remy Div. A. N. Templeton, who was in charge of the foundry during the war, will continue as foundry manager in the Allison set-up.

• **Julian Loebenstein** has been appointed sales manager in the new Selenium Rectifier Div. of Radio Receptor Co., Inc., New York. **E. T. Turney, Jr.** has been appointed as sales agent of the division, covering the New York metropolitan area, New Jersey, and parts of Connecticut and Pennsylvania.

• **George Liff**, just returned from 3½ yr of overseas duty in the Air Corps, has been elected vice-president of the Klein-Farris Co., Inc., Boston. Mr. Liff will be in charge of sales of foundry supplies and equipment in Connecticut.

JAMES E. SWEENEY, vice-president and general sales manager, Kropp Forge Co.

• **James E. Sweeney** has been appointed vice-president and general sales manager of Kropp Forge Co., Chicago. He entered the sales engineering field in 1931 representing the Kropp Forge Co., Wyckhoff Drawn Steel Co. and Granite City Steel Co.

• **Robert P. Jones,** vice-president and works manager of the Bradford Machine Tool Co., Cincinnati, resigned recently after having sold his interest in the firm. He had been with the company since 1937.

• **William E. Harrison** has been appointed by the Armco Drainage & Metal Products Co. of Cincinnati, as sales engineer. Prior to service as a major in the Army during which he spent 36 months overseas, Mr. Harrison was in the county engineers office of Cincinnati.

• **Harper M. Sowles** has been appointed vice-president in charge of the Retail Store Div. of Designers for Industry, Inc., Cleveland.

• **Larry S. Andrich** has been appointed vice-president and general manager of the Snyder Tool & Engineering Co., Detroit. It was incorrectly stated last week that Mr. Andrich had been appointed president and general manager.

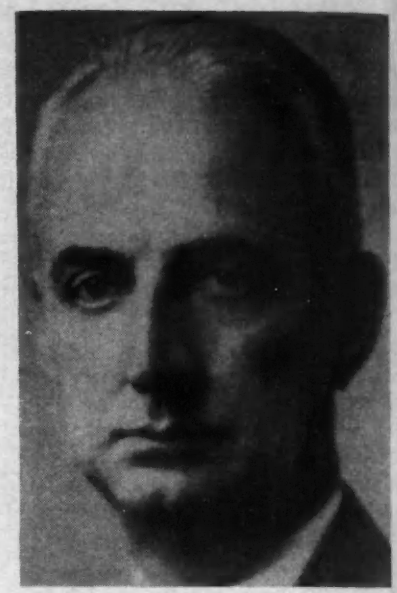
• **John Snure, Jr.,** has been appointed director of public relations for the Bell Aircraft Corp., Buffalo, effective Dec. 1. He succeeds **Stephen E. Fitzgerald,** who has resigned to accept another position in New York in the public relations field.

• **Paul E. Tamplin,** general superintendent of the Sharon works of National Malleable & Steel Castings Co., Cleveland, has been appointed manager of the company's newly established Sharon industrial sales and service office.

• **Dr. Stephen F. Urban,** formerly with Carnegie-Illinois Steel Co. research laboratories in S. Chicago, has been made director of research in charge of all divisions of the research laboratories of the Titanium Alloy Mfg. Co., Niagara Falls, N. Y. These include metallurgical, ceramic and chemical. **Dr. Eugene Wainer,** formerly in charge of the Chemical and Ceramic Divs. of the research laboratories, has been made associate director of research with authority in all three divisions. **William Baldwin** has been made chief of Ceramic Div.

• **Walter G. Nelson,** superintendent of the Ford Motor Co. Iron Mountain plant, has been placed in charge of all Ford operations in Michigan's Upper Peninsula.

• **Robert V. Kerley** has been appointed director of aeronautical research for Ethyl Corp., New York, succeeding **S. D. Heron,** who retires from actual supervision, but remains as a special consultant.



WILLIAM A. MARSHALL, vice-president, Noma Electric Corp.

• **William A. Marshall** has been appointed vice-president of the Noma Electric Corp., New York. Mr. Marshall will be in charge of manufacturing and production for all Noma plants and Noma subsidiaries, including Triumph Industries, Inc., of which he continues as vice-president and member of the board of directors. Mr. Marshall was for 25 yr with U. S. Steel Corp. and in 1939 supervised the construction of the Irvin plant of Carnegie-Illinois Steel Corp., at Dravosburg, Pa.

• **E. U. Lassen** has been appointed assistant chief engineer of Cutler-Hammer, Inc., Milwaukee.

• **D. W. Vernon,** who has been general manager of sales since March, 1945, has been recently elected to the board of directors of A. Leschen & Sons Rope Co., St. Louis.

• **J. D. Ball,** former manager of Ford Motor Co.'s Des Moines branch, has been named truck sales manager for the company, with headquarters at Dearborn, Mich.

OBITUARY...

• **Joseph B. Andrews, Sr.,** 66, president of the Newport Rolling Mill Co., and the Andrews Steel Co., Newport, Ky., for the past 18 yr, died recently after a long illness.

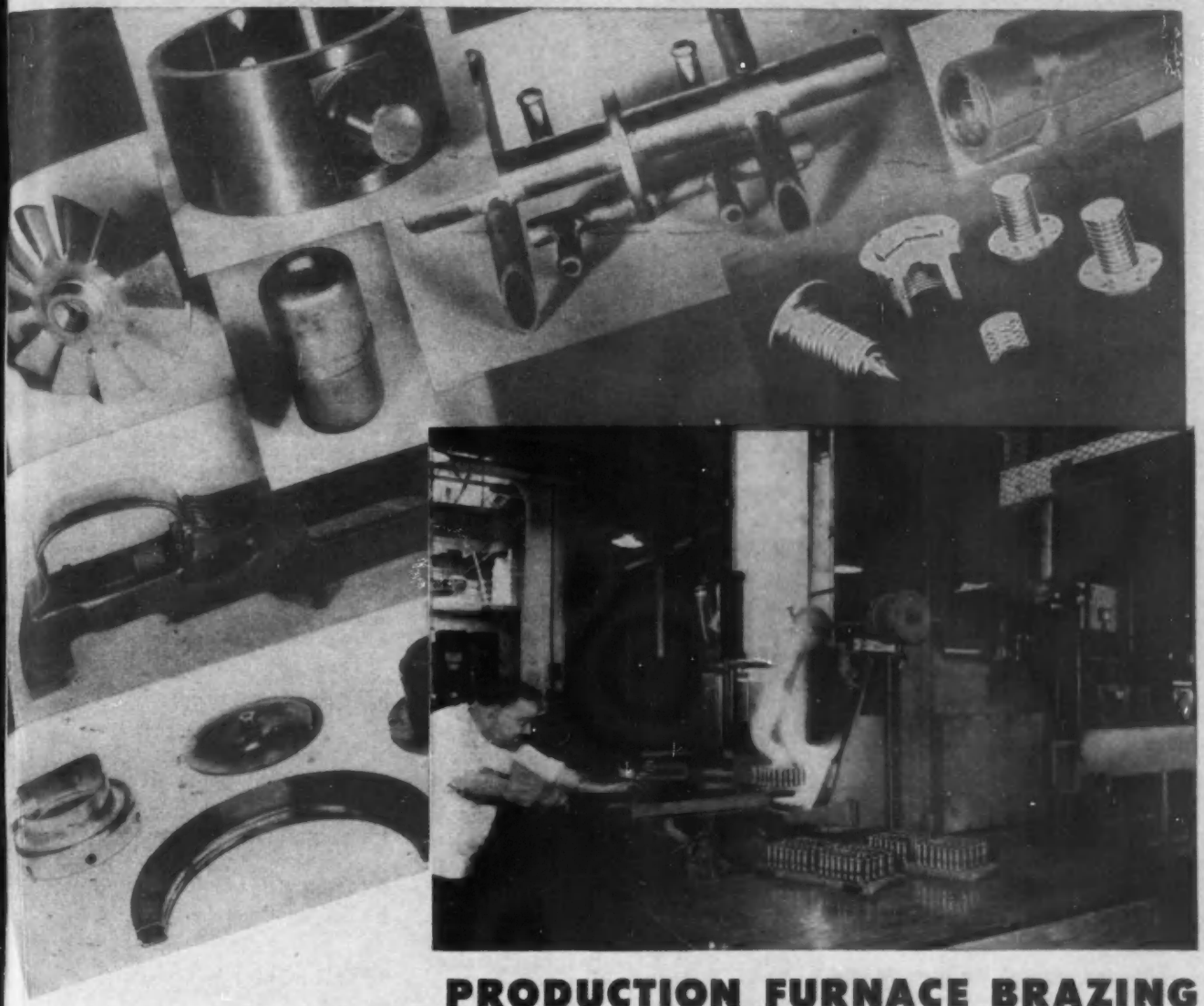
• **John H. Locke,** 57, a retired executive of the General Steel Casting Corp., Eddystone Pa., and a member of the board of directors of the Real Estate Trust Co., died Nov. 12.

• **Sherman C. Dalbey,** president of the Ohio Forge & Machine Corp., Cleveland, and interested in a number of other business enterprises, died Nov. 9. He was one of the founders of the Ohio Forge Co., predecessor of the present company.

• **Harry W. Cowan,** sales manager of the Machine Tool Div. of the Chas. A. Strelinger Co., Detroit, for the past 28 yr, died Nov. 5 after a short illness. He joined the Strelinger organization in 1912.

• **John A. Leschen,** vice-president of A. Leschen & Sons Rope Co., St. Louis, died of heart disease. He was born in 1857, the year the company was founded by his father, and entered its employ in 1875. He was elected a vice-president in 1898.

• **Sidney C. Johnson,** former superintendent of several Milwaukee foundries and a pioneer in the development of electrical steel casting, died Nov. 6 of a heart attack.



PRODUCTION FURNACE BRAZING
Economically Mass Produces These Complex Assemblies

THE speed and cost-cutting efficiency of production furnace brazing won wide acceptance for this new process during the war production battle. Today it is fast replacing slower, more costly forging and machining processes in many leading plants.

Pioneering and experiment are definitely over. Skilled, experienced Lindberg technicians are available to make a quick, thorough analysis of your product and methods—and accurately determine whether this basic new improvement in production technique is suited to your needs.

With every facility provided for fast, easy operation the Lindberg All-Purpose Brazing Furnace produces complex, high-quality metal assemblies with savings in time and money that are often spectacular.

In addition to copper and silver brazing it also sinters powdered metals, does bright annealing and general and high-speed tool hardening. Its precisely controlled temperature range is from 1300° to 2500° F.

Safeguard your prestige and profits. Get full details about Lindberg Production Furnace Brazing and our complete start-to-finish technical assistance now. Write, wire or phone for complete information.

LINDBERG ENGINEERING COMPANY
2452 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

LINDBERG *Furnaces*

SUPER-CYCLONE • CYCLONE • HYDRYZING • BRAZING

Dear Editor:

GERMAN POWDER MACHINE

Sir:

In the last paragraph of "News Front," p. 45 of the Oct. 25 issue there appears a statement that the Germans perfected a method of producing high-grade iron powder directly from liquid metal in a machine of very simple design. Please advise me where I can get further details on this machine and this method of manufacturing iron powder.

W. P. SCHENCK,
Superintendent
Alan Wood Steel Co.,
Dover, N. J.

● We hope to have a story on this in the near future, but for the time being a descriptive article on this machine has not been declassified in Washington and cannot yet be published.—Ed.

MAXIMUM CARBON

Sir:

Kindly send me a tear sheet of the article on "Maximum Carbon in Carburized Cases" by Sidney Breitbart.

F. R. MORRAL,
Metal Trades Laboratory
American Cyanamid Co.,
Stamford, Conn.

● Tear sheets have been mailed.—Ed.

GEOGRAPHICAL LOCATIONS

Sir:

The caption over the picture on p. 114 of the Nov. 8 issue puzzles me. I don't know much Swedish, but I know enough English to guess that Abbots Langley, Herts, is in Anglo-Saxon territory. Herts is the short form of Hertfordshire, as Hants is of Hampshire, and Bucks of Buckinghamshire.

RUTH MISHNUN,
Librarian
American Smelting & Refining Co.,
Barber, N. J.

● We can't blame anyone but ourselves for the error in the caption for the prefabricated homes being erected in Hertfordshire.—Ed.

FRENCH IMPORTATION INQUIRY

Sir:

A group of American air engineers have counselled me to get directly in touch with your organization in order to obtain a support near American firms who consider exporting to France. My activity has exercised itself for almost 20 yr in the automobile branch, since I am attached to the sales dept. of the Ford Motor Co. I am very familiar with all questions pertaining to automobile and mechanics industries in France and I hold a large clientele among the dealers and garages. I have the intention to organize an importation business, concerning all that interests garages, especially machine tools, small tools, vanadium wrenches, electric equipments, screws, bolts, cleaners, etc. I am ready to do all that is necessary for the diffusion of American trademarks here, as I feel that there is a very important opening to them. I possess important financial and governmental support which would enable me to undertake the importation of such products on a large scale.

MARCEL COLA,
Inspecteur Commercial
12 Rue Piccini,
Paris 16e

● Anyone interested?—Ed.

IMPREGNATING STEEL

Sir:

Please send me a copy of your extremely significant article entitled "Chromium, Silicon and Aluminum Impregnation of Steel," which appeared in the Oct. 18 issue.

JAMES L. ERICKSON
Die Casting,
Cleveland

● Tear sheets have been mailed.—Ed.

LABOR TROUBLE

Sir:

We recently received and reviewed your Nov. 1 issue. The editorial "Labor Trouble in the Barnyard" written by Mr. Van Deventer was very interesting and had real meaning. We are writing to request permission to copy this article for distribution to our plant managers, giving credit of course to THE IRON AGE and to Mr. Van Deventer.

G. D. KING,
Industrial Relations Analyst
U. S. Gypsum Co.,
Chicago 6

● Permission has been granted.—Ed.

DIAMOND TOOL BIBLIOGRAPHY

Sir:

Mr. Grodzinski of the diamond research dept. of the Diamond Trading Co., Ltd., London, has written me concerning the article "Selection and Use of Diamond Tools" which was published in THE IRON AGE, Aug. 30 and Sept. 6, under the name of Mr. E. L. Murray. Part of this material published under Mr. Murray's name was taken from a recent publication "Diamond Tools" by Paul Grodzinski, who has kindly permitted the Research Committee to use it in connection with preparation of the manual on metal cutting.

M. MARTELLOTTI,
Chairman—ASME Research Committee on Metal Cutting Data & Bibliography
Cincinnati Milling Machine Co.,
Cincinnati 9

MAGNESIUM REPRINTS

Sir:

Our department is releasing a series of articles on the subject of magnesium. I would appreciate receiving permission to reprint the article appearing in the Dec. 3, 1942 issue of THE IRON AGE entitled "Health Aspect of the Magnesium Industry."

FARIS N. COWART,
Director—Div. of Statistics & Research
Dept. of Labor & Industry,
Lansing 13, Mich.

● Permission has been granted.—Ed.

DRILL-PRESS WORK TIME

Sir:

I would appreciate receiving a reprint of "Time Allowances for Drill-Press Work" by C. T. Post, which appeared in the Sept. 20 issue.

N. L. SCHMEICHEL,
Special Service Staff
Ernst & Ernst,
Milwaukee

● Reprints of this article are not available, but tear sheets have been mailed.—Ed.

PRECISION CASTING

Sir:

Please send two sets of tear sheets of "Precision Casting of Low Alloy Steels" by Capt. L. W. Gott, which appeared in the June 21 issue.

A. ROMMELI.
Sam Tour & Co., Inc.,
New York 6

● They're in the mail.—Ed.

SEIZED FOREIGN PATENTS

Sir:

About a year ago THE IRON AGE published a list of alien patents available to U. S. companies. If a reprint of the list is still available, would you kindly send me a copy.

WILLIAM A. HOYER
Mobile Engineering Co., Not Inc.,
Chicago 22

● The reprint "Seized Foreign-Owned Patents and Patent Applications for Metal Products and Processes" may be obtained at 30¢ per copy—Ed.

FABRICATING CYLINDER BORES

Sir:

Could you please send me more information about "A new means of fabricating cylinder bores includes a honed finish after boring, coating with manganese phosphate. This permits rapid seating of piston rings, and gives protection against scuffing during the early life of the engine." This appeared in the "News Front" of the Oct. 11 issue.

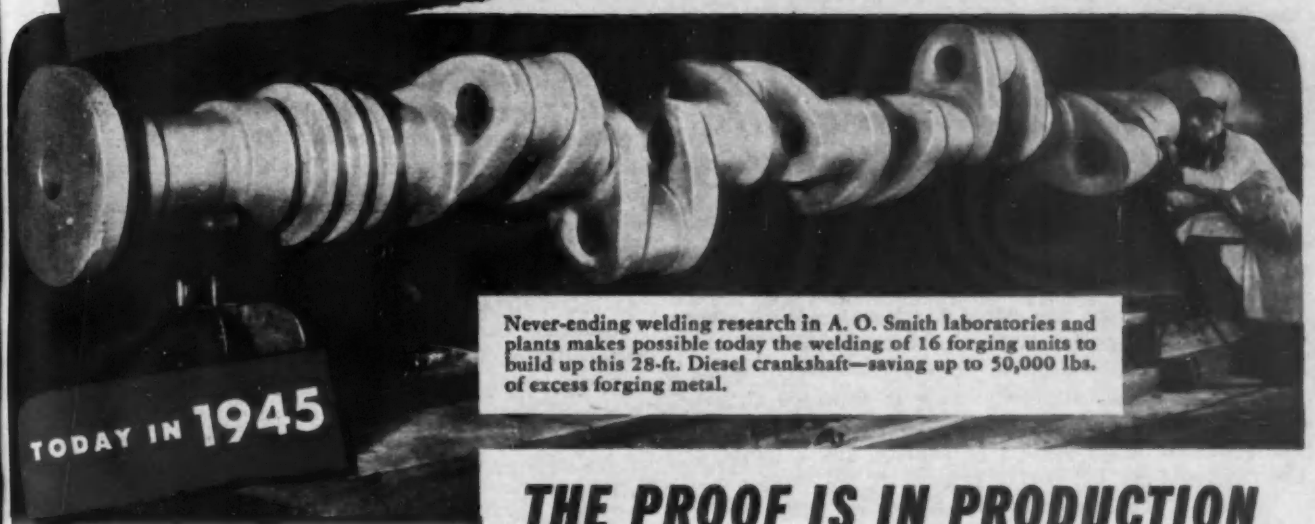
K. G. PRESSER,
Chief Metallurgist
National Supply Co.,
Springfield, Ohio

● Additional data on fabricating cylinder bores appeared on p. 78 of that issue. A tear sheet of the article has been forwarded.—Ed.

RESEARCH BEHIND THIS 1918 AXLE HOUSING . . . . →

MAKES THIS CRANKSHAFT POSSIBLE TODAY ↓

Weld tensile strengths of 50,000 to 60,000 p.s.i. achieved with SMITHway-developed, paper-coated electrodes made it possible, in 1918, to weld longitudinally automotive rear-axle housings—a tremendous step forward in the relatively primitive art of welding.



Never-ending welding research in A. O. Smith laboratories and plants makes possible today the welding of 16 forging units to build up this 28-ft. Diesel crankshaft—saving up to 50,000 lbs. of excess forging metal.

THE PROOF IS IN PRODUCTION

Prior to World War I, welding electrodes were imported from England. When war brought shipping restrictions, A. O. Smith chemists and metallurgists developed a new and radically improved type of shielded arc electrode. They coated the bare wire with paper . . . produced welds of high ductility with tensile strength equal to that of rolled steel plate.

The SMITHway welding research and development that began in 1917 have never ended. They continue today in A. O. Smith laboratories . . . and in A. O. Smith plants, where more than 320,000 SMITHway Electrodes are used in actual production every day. Millions more are used by other manufacturers.

Everywhere farsighted management is studying how welding—the modern production tool—permits improved design, cuts cost, simplifies production.

SMITHway WELDING ELECTRODES

Mild Steel . . . High Tensile . . . Stainless Steel

made by welders . . . for welders

Now **. . . a Complete Line of SMITHway A. C. Welders**

The expanded line of SMITHway A.C. Welders includes three new models of 150-, 200-, and 250-ampere capacity, in addition to the Heavy-Duty Models of 300-, 400-, and 500-ampere capacity. Write for complete specifications and prices.

SMITHway Certified WELDING ELECTRODES

A. O. SMITH Corporation

NEW YORK 17 • PITTSBURGH 19 • CHICAGO 6 • TULSA 3 • HOUSTON 2 • DALLAS 1 • LOS ANGELES 14 • SEATTLE 1

INTERNATIONAL DIVISION: MILWAUKEE 1 • In Canada: JOHN INGLIS CO., LTD., TORONTO

This Industrial Week . . .

- **Steel Labor-Price Controversy More Serious**
- **No Steel Strike Seen Before January, 1946**
- **Steel Ingot Rate Up One Point to 83 Pct**

UNLIKE events in the automotive industry where labor-management tussles were rushing towards a climax this week, the steel wage controversy was leisurely shaping up into a cautious but cold-blooded bid by both sides for a pattern which would reveal the course of steel labor trends for some time to come.

While the probability of an industrywide steel strike was even stronger than ever in view of the surprise and right-about move of the OPA in denying the steel industry a past-due and promised price adjustment, it was apparent this week that steel mill shutdowns would not occur before the new year.

Steelworker strike votes will be counted this week in close to 800 steel and steel processing plants, but a number of elections are slated for Dec. 6. With labor stakes high, the policy of Philip Murray, USWA head, in directing the steel union during the current situation is "no illegal strikes" which is expected to preclude any series of wildcat stoppages. The word is going out to union leaders to squelch any attempt of the rank-and-file to start a premature walkout.

Past procedure indicates that the union policy committee will meet after the strike votes are counted to decide a "future course." This meeting will probably take place around Dec. 10 to 15. Following such meeting it is unlikely that any steel strike will be called until January, 1946. The union brain trust is as aware as management that any losses incurred in December of this year would mean more taxwise, than if the shutdowns occurred in 1946 in view of the recent changes in the tax law.

The bombshell tossed into steel price-wage controversy by the OPA has not become a definite part of the whole problem. Steel industry leaders have gone on record that there would be no further wage negotiations until OPA granted what the industry has claimed to be necessary price adjustments covering past wage and material costs. The OPA statement that steel earnings would be reviewed after fourth quarter reports have been completed, only serves further to confuse the issue because such reports will probably not be in final shape until mid-February, 1946.

The offer of the OPA to do something for the small nonintegrated mills carries no weight in the steel industry because it runs counter to steel selling practices. If the smaller mills were to have higher prices than the larger mills, steel consumers would by-pass the smaller plants and place their orders with the larger units. This matter has been thrashed out many times before and the industry is surprised that at this late date such a solution has been offered. Furthermore. steel industry members will probably demand a price increase guarantee before agreeing to any wage demands in view of the past long-drawn-out OPA studies previous to price adjustments.

LITTLE evidence is shown of realization by the public of how directly a steel strike will affect manufacturing activities outside the steel industry itself. From the standpoint of unemployment and delay to reconversion, a steel stoppage will be but the initial detonation setting off a chain reaction in all manufacturing industries using steel.

Practically without exception steel users have been living from hand-to-mouth and are without inventory allowing them to continue manufacturing in case of a strike. Most manufacturers, it is expected, would have to shut down two or three days from the beginning of a steel walkout. Few orders have been received from the automobile industry to stop delivery of steel previously ordered. Automotive steel is being shipped to warehouses near producing centers to be on hand when the automotive wage issue is settled.

Despite the effort of the steel industry to control the volume of new orders, fresh business this week was again outstripping shipments. A wave of ordering in the past two weeks, partly in anticipation of a price increase and partly in jockeying for position on schedules, indicates complete abandonment of reluctance by customers to order their needs far in advance. It is estimated that the steel industry's backlog has increased by more than half a million tons in the past two weeks.

ONE serious byproduct of OPA's failure to adjust steel prices will be the necessity for many steel companies to step up production on those items for which the return is greater and cut down output of the products on which the company claims money is being lost. Items such as structural steels, reinforcing bars, rails and railroad track accessories may find themselves in the category where production has been forceably curtailed.

Steel ingot output this week has advanced one point to 83 pct of rated capacity and it is not expected that the level will go much higher in the near future.

It is expected that the coming winter will be a critical period as far as the scrap situation is concerned with the possibility that reconversion is due for a setback. Consumers throughout the country and in Canada report low stockpiles on hand with no relief in sight. Prices are holding firm at ceilings and are at present stronger than at any time in the past few months.

• **CAR INQUIRIES**—While railroad car purchasing is active in the passenger-type car, freight car inquiries have fallen off far below normal. About the only active inquiries now out of any consequence are those of U. S. Steel Corp., for cars for its subsidiary railroads. Passenger car inquiries are for other than sleeper-type units, mainly coach and dining cars. Locomotive business is strong. Deliveries on freight cars are now being quoted as late second quarter, but the labor situation will have a lot to do with deliveries. The French Railway Mission is expected to come into the market at any time now with inquiries for 10,000 20-ton gondolas and 26,750 20-ton box cars. This should put car deliveries well into the second half of 1946.

• **IMPROVED MATERIALS**—Of the new designs and appearances of apparatus and equipment that will come out as soon as reconversion is completed, Westinghouse Electric Corp. claims that at least 50 pct of them are made possible through the development of new and improved materials and the remainder through design skill.

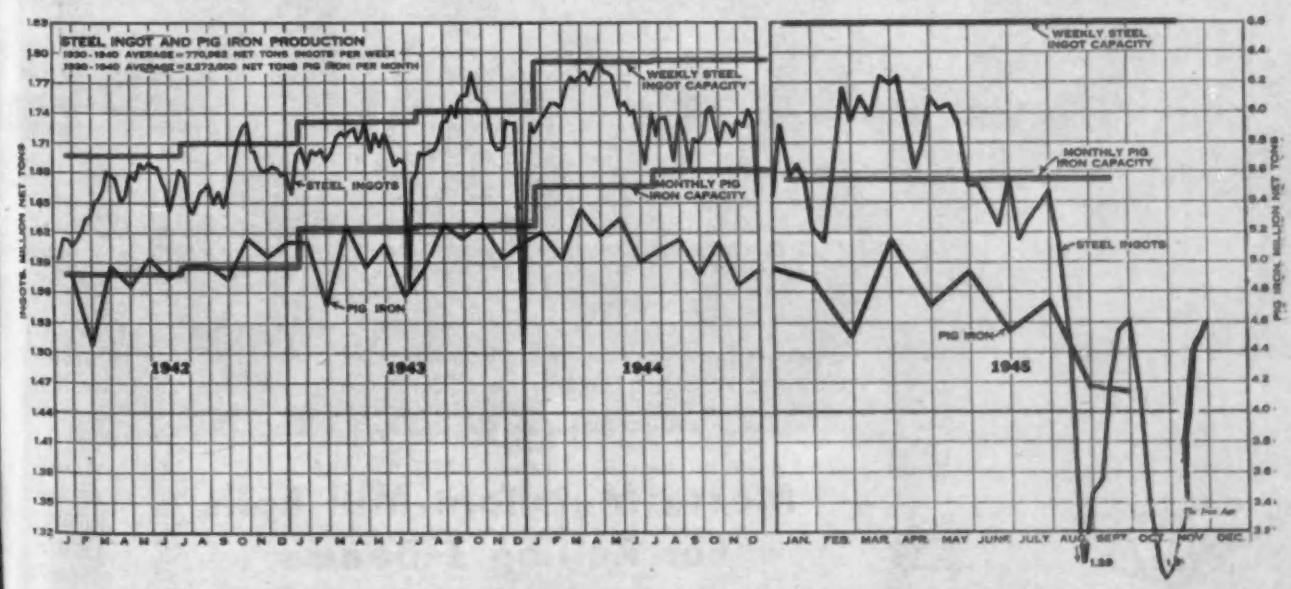
• **PREFABRICATED HOME OUTLOOK** — Construction of 250,000 prefabricated housing units by 31 manufacturers during the first six months of 1946 was predicted by R. J. Willis, of the Willisway System, in Chicago recently. Difficulty of concentrating at a central distributing point various component materials from separate sections of the country was listed as the greatest obstacle to mass production of prefabricated housing. He cited construction speed as the greatest sales feature, with assembly of low cost units in three weeks and higher priced units in from ten days to two weeks.

• **IRON ORE CONSUMPTION**—As a direct result of the recent coal strike which caused the closing down of many blast furnaces and threatened to curtail boat movement, consumption of Lake Superior district iron ore in October dropped to 4,491,246 tons, according to the current report of the Lake Superior Iron Ore Assn. This was 1,345,771 tons less than September consumption and the lowest for any month since April 1940, when the 30-day aggregate was 3,934,853 tons. According to the association's report, only 126 American and six Canadian blast furnaces consuming this ore were active Nov. 1, leaving 59 American and four Canadian shut down on that date. A month ago, 148 furnaces were active and a year ago, 166. Ore inventories on Lake Erie docks and in furnace yards Nov. 1 were reported at 45,090,166 tons, compared with 45,342,562 tons in the stock piles on the same date a year ago.

• **ARMOR PLATE FREIGHT RATES**—The Interstate Commerce Commission in a Nov. 20 decision modified its Aug. 28 findings, which reduced carload rates on armor plate, so as to permit railroads in official classification territory to maintain the prescribed rates without lowering them to the basis of special commercial steel rates that have been established to meet competitive conditions. The reduced commercial steeel rates relate chiefly to shipments of less than 100 miles. The armor plate decision reduced rates, except in southern territory and between that territory and official classification territory, to a level with commercial steel rates on armor plate and shapes less than 3 in. in thickness and to 115 pct of the commercial steel rate on armor plate and shapes 3 in. or more in thickness.

• **COLUMNIST PREDICTS**—From Stan Brams' report concerning the General Motors strike in Assembly Line this week—The overwhelming odds favor a strike which will extend at least through the end of this year. By that time, General Motors' competition will be producing cars in greater volume, and the 1945 tax factor will have evaporated. By that time, also, reserves will have begun to evaporate and somewhat cheerless Christmases will have put steam behind wifely urgings on the rank-and-file to get back on the job. By that time, too, the effect on the national economy will be growing, and Washington will be putting pressure in the direction of a settlement. Here, therefore, is a freehand prediction, subject as always to the footnote that in labor affairs the diametrically opposite can happen with complete logic; the General Motors strike will continue until about Jan. 19, a Saturday night 60 days from the start of the walkout. The settlement formula will give the workers approximately a 15 pct increase in wages. The condition that price increases based on this pay raise must be withheld will be forgotten. It is all rather depressing.

• **FAIRLESS SPEAKS AGAIN**—From Atlanta, Ga., recently B. F. Fairless, U. S. Steel Corp. president said said: "Industry cannot live half free and half slave. Once the OPA is out of the way and we can arrive at a fair price for our products, I am certain that labor and management can get together on a fair wage increase."


STEEL INGOT AND PIG IRON PRODUCTION
1930-1940 AVERAGE = 770,982 NET TONS INGOTS PER WEEK
1930-1940 AVERAGE = 2,573,000 NET TONS PIG IRON PER MONTH
WEEKLY STEEL INGOT CAPACITY
STEEL INGOTS
MONTHLY PIG IRON CAPACITY
PIG IRON
INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
1942
1943
1944
1945
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St Louis	East	Aggregate
November 20...	77.0	90.5	79.5*	90.5	87.0	100.5	75.0	95.0	99.0	48.0	75.0	70.0	85.0	82.0
November 27...	77.0	94.0	80.5	90.5	84.5	102.5	75.0	95.0	101.0	51.0	76.0	70.0	85.0	83.0

* Revised

ARMY NAVY

**Mesta Merchant Mill Rolls
For Rolling I-Beams**

MESTA MACHINE COMPANY · PITTSBURGH PA

Long Awaited OPA Steel Price Action Is a Dud

Washington

• • • OPA's denial on Nov. 23 of steel price increases came after some nine months of conflicting reports, delays and false starts. It still is a source of mystery as to just what went on in inner government circles that brought forth the jolting turn down of the industry's request for higher prices, which, it claims, are necessary to meet present costs.

Further wage boosts, the industry is insisting in its controversy with the USW-CIO, cannot be granted without additional price increases over those that had been asked. Generally, the industry wanted a $7-a-ton increase on rolled carbon steel. Inevitably, OPA's refusal to allow increases at this time is thought to be a delayed action move to keep the lid on until the steel labor situation is cleared up.

It had been clear for some time that OPA, under its so-called anti-inflation policy, would not permit increases this high. This position was given force by the mild retail price increases allowed Ford and Studebaker and the actual cut in General Motors prices. The two cases are definitely tied together since automobile prices are substantially affected by steel costs. OPA also clearly walked a tight rope in passing on the steel case because action taken in this basic industry would have a broad repercussion on prices in industry generally and therefore affect the national economy.

There was, however, only a small minority that had expected OPA flatly to turn down price increases. This was true of OPA circles as well as outside of the price agency, in which there evidently was a division of opinion. The general view, which had all the aspects of being soundly based, was that OPA would allow steel price increases of $2.50 to $4.50 a ton on rolled carbon products.

It is urged that there was reason to believe that increases were in prospect. It is not posible to give better authority for this statement than to refer to a recent interview THE IRON AGE had with Mr. Bowles who said that the steel industry is entitled to higher prices. It may be added, however, that Mr. Bowles also indicated that OPA might grant price increases only to small non-integrated companies, an action which OPA's press release reveals is in contemplation.

By L. W. MOFFETT

• • •

Small companies have opposed this plan realizing that once ample tonnage was available, they would have to meet the lower prices of their large competitors or be shut out of the market.

Because of this position of small producers and by reason of the fact that they joined in the request for an industrywide price increase there is speculation on the outcome of the early meeting of OPA's General Steel Producers Industry Advisory Committee. Mr. Bowles stated that OPA has been deeply concerned over the fact that many of the small non-integrated steel companies are in financial hardship. The meeting, he said, is being called for the specific purpose of discussing what price action may be taken to lessen the financial hardship of these companies. That Mr. Bowles considers the situation urgent is evidenced by the fact that the usual 10-day waiting period for such a meeting has been waived.

This explains his statement, which is in direct conflict with the contention of all steel producers, that there is no cause at this time for a general increase in steel prices. The plan now is to raise prices for small companies soon and to let the larger companies sweat it out. Mr. Bowles promised that "the situation would be reviewed promptly and carefully when the next financial returns of the steel companies are submitted after Jan. 1, 1946."

Past experience with OPA again gives the discouraging outlook of long delayed action under the new study while the industry goes deeper into the red and is bedeviled with the prospect of ever mounting costs through further wage demands. Doubt exists that the study would be either prompt, careful or fruitful.

This proposed study, in the opinion of industry sources, was viewed as being in accord with the wage-price directive announced by President Truman on Oct. 30. This directive provides that the Price Administrator shall after a waiting period of six months take wage increases into consideration when authorizing price increases.

Moreover, industry insists that an immediate price increase is necessary with another due if labor costs rise again. It does not accept as accurate OPA's statement that it has carefully studied the financial and cost data it submitted to OPA. Contrary to OPA's position it maintains it has made out a clear case under standards approved by Congress for price increases necessary to earn the return it enjoyed in a representative peacetime period.

The measurement used for the steel industry was the 1936-39 base period which, it has been pointed out, was

Chronology of Steel Price Case

Washington

• • • **The first relief granted steel producers by OPA was on Jan. 11, 1945, when interim price increases ranging from $2 to $5 per ton were granted on carbon steel plates, standard rails, nails and staples (other than galvanized), hot rolled carbon steel sheets and galvanized iron and steel sheets.**

Final action was forthcoming on May 23, 1945, when OPA authorized increases which, when taken together with the interim relief, totaled from $2 to $7 per ton (or from 1 pct to 2 pct) on 18 mill products. Those additional which were included in the final adjustment were carbon steel blooms, billets, slabs, sheet bar, tube rounds, tube billets, tie plates, hot rolled bars, hot rolled wire rods, manufacturers' and merchants' quality wire, twisted barbless and barbed wire, bale ties and track spikes.

A price increase of $2 per net ton on cold finished carbon steel bars was announced Aug. 6. At the same time, OPA authorized offsetting reductions per net ton of $2 and $6 on ceilings of two extra charges for certain annealing and testing operations.

The extra for producing cold finished bars to U. S. Government specifications, which included physical testing, was reduced to 15¢ per 100 lb. (or $3 per net ton) from 25¢ per 100 lb. (or $5 per net ton).

Stress and strain relieving extra for cold finished bars produced under government specifications for use in manufacture of shell and ammunition components was reduced at the same time to 45¢ per 100 lb (or $9 per net ton) from 75¢ per 100 lb (or $15 per net ton).

sub-standard from a point of being a representative peace period. OPA's contention that steel earnings for the first nine months of 1945 were well in excess of the 1936-39 standard has met with the statement that the nine months period necessarily was abnormal, covering war months, and actually only a limited number of steel prices yielded fair profits.

The OPA contention that confusion has followed VJ-Day and therefore not representative of more normal operating conditions is held to be evasive. The industry maintains it was prepared for orderly reconversion to normal conditions but has been hampered by labor troubles which the government has in no way prevented and given no indication when the confusion will end. In any event, industry says it cannot continue endlessly at prices, which Benjamin F. Fairless, president of the U. S. Steel Corp. has said do not provide a sufficient return to pay current costs of steel operations let alone any increase in wages.

The backstage moves behind OPA's decision to deny price increases at this time are shrouded in official secrecy but there has been plenty of speculation which can be given for what it is worth. It may be added, however, as a fact that Mr. Bowles only recently made a positive statement that the steel industry was entitled to some price increases. It appears that Mr. Bowles has done an about face.

In the three-cornered discussions preceding the decision, the top echelon of the price agency was reportedly strong against any weakening of the price-wage front. Quite to the contrary, War Mobilizer John Snyder, it was said, had shown some sympathy toward the steel producers' cause. The upshot of the whole thing, according to one source, was that two proposals finally were submitted to the Office of Economic Stabilization, headed by Judge John C. Collet, one calling for some relief; the other standing pat for the time being.

Apparently after tossing all the factors, highly flavored with labor perplexities, in a revolving mixer, it was hopefully decided to kiss the steel industry off until economic reconfusion has been unscrambled.

Industry Reacts to OPA Steel Position

Chicago

• • • **Refusal of OPA to grant higher** prices on steel to the industry as a whole will in the long run result in smaller production of those items on which producers incur operating losses, operating officials believe.

This will mean that some types of steel vital to reconversion, particularly in the construction field, will be produced only in small quantities. Rails and track accessories, such as tie plates and spikes, galvanized sheets and reinforcing steel have been consistent money losers for most mills. Structurals and plates are in the twilight zone of profit and loss.

Informed sales officials were surprised at and question the veracity of Price Administrator Chester Bowles' statement that the industry as a whole has so far had 1945 earnings equal to or greater than those in the 1936-39 yardstick period. Few steel men believe that the industry can expect much different treatment at the end of the year, when the Price Administrator said that profit records would be re-examined.

Even the non-integrated producers, who Mr. Bowles said would receive individual price relief according to their needs, take little comfort from the announcement. These producers depend on the larger steel companies as sources of semi-finished steel, a notoriously low profit item to producers. In recent weeks, primary producers have been themselves utilizing most of their semi-finished steel for further conversion into more profitable finished products. The price advance decision gives them no incentive to divert a greater portion of their semi-finished production to the non-integrated companies.

Small Steel Producers To Reject Price Offer

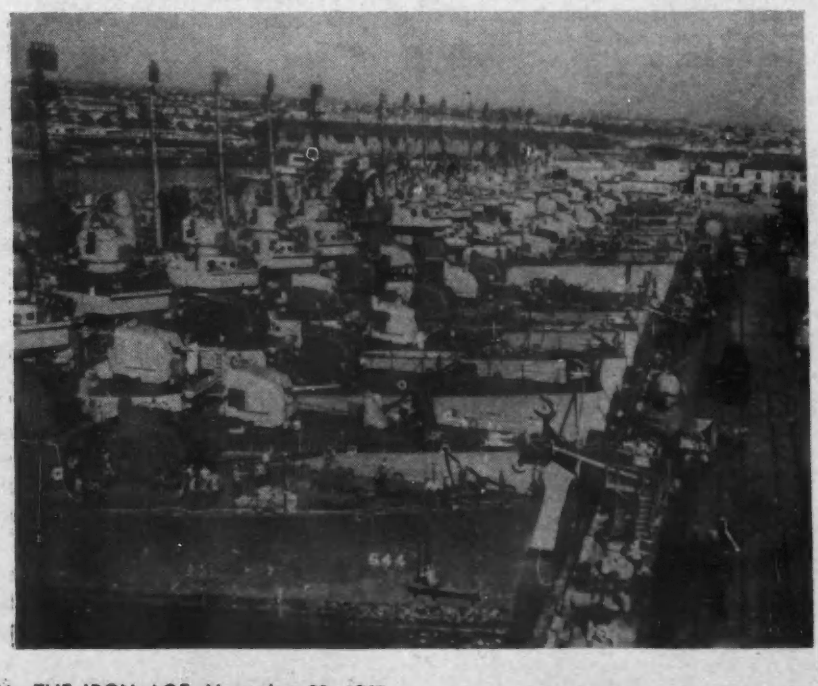
Washington

• • • **Representatives of smaller,** non-integrated steel producers at a meeting held in Washington, Nov. 27, indicated that they would reject Price Administrator Chester Bowles's offer of relief "to lessen the financial hardship" of those companies.

This meeting, which was called preliminary to the forthcoming meeting of the OPA General Steel Producers Industry Advisory Committee, will determine future strategy of the smaller producers in their fight to improve their constantly deteriorating financial position.

Lauson Stone, president, Follansbee Steel Corp., Pittsburgh, told THE IRON AGE that OPA's proposal to afford small producers price increases would be a "kiss of death" in view of the competitive situation within the industry. Unless such increases are on an industry-wide basis, he said, the smaller producers prefer to stand pat.

RETIRED VETERANS: *Destroyers line the dock at the San Diego destroyer base in various stages of overhaul preparatory to being placed on inactive status. The ships are being repainted and the equipment and armament are being coated with protective materials.*



Far-Reaching Steel Freight Rate Changes Agitated

Chicago

• • • West Coast steel consumers may get cheaper steel irrespective of the operating status of new far western mills.

Agitation for lower rail freight rates from the Pittsburgh-Youngstown-Cleveland districts to Eastern ports and for lower water rates on intercoastal steel shipments, if successful, would sharply trim competitive advantages in the West Coast market now held by mills at Sparrows Point and Birmingham.

Eastern railroads, sensing the opportunity to gain new traffic may not seriously resist the freight reduction.

The first concrete move lies in a proposal which would provide a 25 pct reduction from domestic rail rates on carload shipments of iron and steel from Pittsburgh, Youngstown, Cleveland and Lorain, Ohio, producing points to Baltimore, Philadelphia and New York when movement via intercoastal water carriers to the Pacific Coast is involved. The joint conference committee of the railroads has tentatively scheduled hearings on the proposal, carrying Central Freight Association docket advice number 79020, at Buffalo the second week in December.

The proposal, made by an eastern steel producer, aims to give steel shipments to Atlantic ports similar treatment to those to Gulf ports, which enjoy a reduction from domestic rates on steel which is to be shipped by water to the West Coast.

Present domestic rates from Pittsburgh to Baltimore are 30¢ per 100 lb; to Philadelphia, 32¢; and to New York, 36¢. These rates, it is proposed, would be 23, 24 and 27 cents, respectively, if the reduction is approved. From Youngstown, present and proposed rates are 33 and 25¢ to Baltimore; 35 and 26¢ to Philadelphia; and 39 and 29¢ to New York. From Cleveland and Lorain, present and proposed rates are 36 and 27¢ to Baltimore; 39 and 29¢ to Philadelphia; and 41 and 31¢ to New York.

The proposal points out that although the domestic rail rate from Birmingham to Mobile is 31¢ a rate is given on steel destined for intercoastal shipment of 19¢. Likewise, from Chicago, the domestic rate is 55¢, but the rate for steel destined for intercoastal water shipment is 47¢.

Car loading is not involved, the present minimum weight of 40,000 lb still standing.

By CHARLES T. POST

o o o

The reason for offering the proposal at this time is the recent resumption of intercoastal water service by the War Shipping Administration. A more obscure factor is the construction of far western steel capacity during the war which would tend, particularly if steel prices are reduced by far western producers, to shove Pittsburgh-Youngstown-Cleveland producers completely out of the far western market. Also involved is the possibility that a realinement of the basing point price system on steel, considered likely in many quarters, would adversely affect the market areas of the producers in these districts, forcing them to aggressively seek other outlets.

The eastern railroads likely will be caught between opposing pressures on the rate reduction. The Pittsburgh-Youngstown-Cleveland mills will hold forth the lure of additional traffic on finished steel and the threat that if these districts are affected adversely for reasons cited above the railroads also will suffer. No doubt, plans of United States Steel Corp. to modify its production emphasis by possible construction of an East Coast mill also will be held over the head of the roads. Bethlehem, anxious to maintain the superior advantage of its Sparrows Point, Md., mill in West Coast competition, on the other hand, can point to the substantial traffic which it gives to the roads on raw materials and indicate that any rate adjustment which adversely affects its position would likewise affect this traffic.

The move to lower intercoastal water tariff on movements of steel via the Panama Canal has not officially come into the open, but is expected to be broached officially at any time. The proposal would spring from West Coast steel users, probably with the support of eastern steel producers who do not operate their own steamship lines. The present published tariff on intercoastal water shipments is $11.00 per ton. Pacific Coast steel prices reflect the eastern base prices plus approximately this $11.00. However, the westerners long have contended that United States Steel Corp. and Bethlehem Steel Co., which operate subsidiary steamship lines, had prewar out-of-pocket costs of approximately $6.00 per ton on this movement. The actual figures are

PICKING UP: *Now working three openhearths, Kaiser Co. will soon light a fourth. Freight rate agitation in the East, if successful, will have bearing on western mills' production.*

closely held, and never have been verified.

With a reduction in the published tariff, the westerners feel, other steel producers would be given access to the Pacific Coast market on equal terms with the two big producers, and western prices would reflect directly whatever reduction was made in the water tariff.

The water tariff is under the jurisdiction of the Interstate Commerce Commission as are rail freight rates. Railroad spokesmen have stated unofficially that any proposal to reduce intercoastal water tariffs would be examined closely by the railroads with an eye to its effect upon movements to the western hinterland by rail as well as transcontinental rail movements. If the water rate were reduced considerably the tendency would be to ship to the West Coast by water then backship by rail to interior points now served by the transcontinental railroads. The relationship of transcontinental rail rates and intercoastal water rates has been taken into account in the past by ICC, and no doubt will be in the future.

A reduction in intercoastal water rates might reduce considerably operating prospects of the big Geneva, Utah, government-owned steel plant. Proponents of Geneva, which is saddled with a $12 per ton rail rate to the Coast, have contended that this rate should be reduced to parity with out-of-pocket costs to eastern steel producers shipping to the Coast on their own vessels. If the intercoastal published tariff is reduced, Geneva is a dead duck unless a corresponding reduction in its rail freight rate to the Coast can be secured.

Bethlehem Steel Co., whose reputedly low production costs at its Sparrows Point mill and low water transportation costs to the West Coast long have been the envy of competitors, is understood to be taking steps to further improve its position in this market. Included is the construction of a new continuous hot strip mill and cold reduction mill at Sparrow Point which would improve its ability to serve the West Coast as well as local markets.

The perennial controversy over fabrication-in-transit regulations may again soon break into the open. Also in the Interstate Commerce Commission's lap, the privilege of fabricators of substituting bills of lading of similar steel products to take advantage of f.i.t. regulations may come up for scrutiny, possibly from ICC itself. Although the entire f.i.t. setup may not now come up for attack, as it has in the past, concrete objections appear to center around the broad range of products within which a fabricator may make substitutions at his plant before reshipment.

Steel Price Struggle Now Raging in England

London

By JACK R. HIGHT

• • • **Negotiations are currently underway in London in an effort to settle amicably the differences of opinion on steel prices and specifications which have caused considerable ill feeling here between steelmakers and motor car firms. Still a favorite subject in certain newspapers here, the battle is one which has seen the light of day most frequently in the "Letter to the Editor" columns, preferred media in Britain for all ticklish controversies.**

Due to the wide gap between the two positions on the subject, it seems doubtful at present that too much can be hoped for in the way of a permanent settlement of all points at issue, although some compromise on principal questions will probably be arrived at in the near future.

Basic problems at issue are:

1. Steel prices.
   a. Auto makers assert that their high costs for new models are in some measure due to the high cost of steel.
   b. Steelmakers take the same tack and point to the cost of coal as the basis for their prices.
2. Steel specifications.
   a. Automotive manufacturers state that they cannot get the steel producers to make the material they need.
   b. Steel firms point to the large number of variations in requirements, and ask for larger orders of specific types.

The above outline, of course, vastly oversimplifies the problems at hand, but is indicative of their nature, if not their scope. To the casual observer it would seem that with the cooperation of the British Standards Institution, the second problem will eventually be solved to the satisfaction of all concerned.

The former, however, will certainly require much modification of present positions before any sort of agreement can be reached. The two parties concerned, as far as press reports indicate, are at present poles apart. Add to this the fact that the current trend of steel prices here is inevitably upward, widening the breach, the seriousness of the problem becomes apparent.

Much time is being spent at the moment by most of the people taking part in the controversy in comparisons of both the auto prices and the steel prices with the counterparts for American products, despite the fact

TIN SOLDIER: *Photo shows huge stocks of tin left behind by the Japanese, under close guard by an RAF sentry, in Penang, Malaya.*

that the fallacies of such comparisons are readily apparent.

Basically the problem seems to be that the automotive firms, aware of the fact that they must take their important share of the responsibility in the British export drive, are genuinely anxious to get their prices down to where they are as attractive as possible. They are as always, keenly respectful of the tremendous size of the American industry, and of its competition for the export trade. They have harbored a feeling since the introduction of the first continuous strip mill in the British Isles that certain steel prices should be reduced, and hope that continued pressure will see those prices go down.

In price matters the British industry is in a somewhat similar position to the American industry at the moment. Due to rigid controls price levels have not increased with the increases of material costs, so that producers feel that in any reversion to a realistic pricing scheme they must have more for their product.

* * *

End of a month-old dock strike in Britain which had disrupted the steel delivery picture has almost been forgotten now as mills are back to their pre-strike schedules, and stores being held up on the quays are beginning to vanish. The British export drive was particularly vulnerable to the stoppage, and the emphasis on exports in current mill schedules required a revision to domestic orders when the strike was at its worst.

Special priorities being granted to locomotive and freight car builders, as well as shipyards are tending to limit the tonnages that can be allocated to export at the moment, but some material is still available. Despite increasing Board of Trade pressure to do so, it appears doubtful that any large increases in the volume of steel produced for export can be realized yet this year, but it is reported that next year will see 100 pct increases in allocations for export.

The supply situation in semifinished steel here is deteriorating, with demand threatening momentarily to outrun the supply, with the result that arrangements are currently being made for imports from the dominions. Supply of semifinished material is said to be holding up the delivery of sheets badly needed by reconverting industries all over Britain. Sheet deliveries are extended to several months, and many producers are refusing further orders. Current domestic demand for tinplate is described as good, but there has been little export activity in this line from Britain.

Price increases for heavy steel products amounting to $4 per ton for the export trade have been reported here, and the schedule for light sheets has also been advanced. In the domestic market the Steel Control has announced a new price schedule for certain types of mild steel wire and wire products. Hard drawn mild steel wire and uncoated hard drawn mild steel wire in straight lengths remain unchanged in price, but there are increases on other types of wire with important alterations in the prices of wire netting, barbed wire, and certain types of wire rope.

Increases varied from a maximum of $9 per ton for mild drawn bright wire to lesser amounts for other products. The increase for wire netting amounts to approximately 2½ pct, and for chain link fencing approximately 4½ pct. The increment for wire nails in England and Wales amounts to 3½ pct.

Surplus Machine Tool Dealers to Get 12½%

Washington

• • • **The long expected** plan for disposal of surplus government-owned machine tools through dealer channels has been drawn up by the Surplus Property Administration and all that remains is for RFC to iron out a few details and put it into operation.

As directed by Surplus Property Administrator Symington on Nov. 16, the RFC will appoint dealer-agents who will sell surplus tools for and on account of RFC. To be eligible for appointment, dealers in either new or used machinery or persons who would establish themselves in that field must demonstrate to RFC that they are engaged in a legitimate enterprise and have sufficient personnel and facilities to conduct sales for the government. Veterans will be given preference.

Dealer remuneration, which has caused most of the delay in getting the plan ready, will be on an average commission basis of 12½ pct computed on total sales each calendar month. In addition, dealers will be reimbursed for expenses incurred in storing and handling tools removed from plants or RFC warehouses. Tools so transferred will be held on a consignment basis. Financing arrangements will be between the individual purchaser and RFC. Private banking institutions, however, may be employed if the purchaser chooses. Tools will be priced in accordance with the Clayton formula.

According to an SPA spokesman, machine tool manufacturers and distributors may participate as disposal agents provided they otherwise qualify under criteria set up by RFC.

Installs Oil Heating

Buffalo

• • • **The Buffalo Steel** Co. has completed installation of an oil heating system in its rolling mill at Tonawanda which permits a switch from gas to oil, or vice versa, in about three minutes.

ORE LOADER: *Trackson Co.'s Model T7 Traxcavator with a 2½ yd bucket loads zinc ore concentrates into gondola cars at a zinc refinery. Loading a 60-ton car takes* 12 *to* 13 *min.*

Outlines Solution to Surplus Machine Tool Problem

Cleveland

• • • Despite some gloomy overtones, one of the bright spots of the 21st annual meeting of the American Machine Tool Distributors' Assn. was the report of Robert L. Giebel, chairman of the association's committee on surplus property, who prefaced his remarks with the appropriate comment that the surplus machine tool disposal problem has as many suggested solutions as it has machines.

In quasi-prophetic vein, Mr. Giebel declared that "it is important to realize that our markets for new standard machine tools are half dead. Here and there, we will get orders for new standard machines because of some disgruntled buyer who has had unpleasant dealings with the RFC, or used-machinery merchants. Most buyers, however, will put their pride in their pockets and save as much money on their initial investments as possible. It's wishful thinking to believe all government machines are badly worn. Not only must we compete with Government surpluses, but private sales through auctions are beginning to eat the heart out of our business."

Admonishing the RFC to take advantage of this vast sales organization, Mr. Giebel said, "There is one plan which has been suggested that should be mentioned at this time. We refer to the Porter idea which suggested that all machine tools be channeled through the original manufacturer, where they may be rebuilt or disposed of, 'as is', using the established procedures. I discussed this with several manufacturers and found they were not interested.

"For some time," he asserted, "the RFC has had the responsibility of disposing of machine tools, once they were declared surplus. They must follow the policies as set by the Surplus Property Administration, and, at the same time, take into consideration the antics of the Smaller War Plants Corp. That is a tough job. Recently, the loan functions of the SWPC have been transferred to the RFC. We have seen evidence which convinces us the RFC desires to handle this problem in a business-like way, which will give the maximum benefit to the country as a whole. We have considerable faith in this organization.

"At the request of Frank R. Dole of the SPA, A. B. Einig and I visited him on Oct. 15. He wanted to know who should be given the right to sell government-owned machine tools and what resale commission should be allowed. We saw no way of qualifying organizations or individuals, except to state that he could feel safe in accepting the list of distributors belonging to the American Machine Tool Distributors' Assn., the National Machine Tool Builders' and the Machinery Dealers' National Assn. This would give him an immediate sales force of between 2000 and 3000 men.

"He apparently was set," Mr. Giebel continued, "on a resale discount of 15 pct. Mr. Einig explained to him in great detail why he believed that was the practical discount. Mr. Dole then pointed out to us that the SWPC had set up a time payment plan whereby a purchaser can get possession of a machine by depositing 15 pct, and agreeing to pay for the remainder over a period of 5 yr, at 4 pct interest. Mr. Dole suggested that if a salesman closed a sale using this method, 13 pct commission would be paid him at the time the initial payment was made by the customer, and 2 pct at the end of one year. We believe, however, commissions will be paid paralleling the sales contract."

According to Mr. Giebel, "it was agreed a special discount off the Clayton Formula should be given to machine tool builders who would rebuild and guarantee their own machines. Apparently, they have settled on a discount of 25 pct. Considerable time was taken in discussing the difference between the original manufacturer rebuilding his own machines and a used machinery dealer rebuilding anyone's machines. He is considering qualifying this 25 pct discount, but no definite plan was determined. We believe discount should be arrived at after negotiation with each manufacturer.

"Mr. Dole wondered whether a special discount should be given to induce salesmen to try to sell special machines. It was suggested that this might lead to complications and prove impractical. It was also suggested that many single purpose or modified machines be scrapped immediately, as they have no resale value and the cost of storage would be entirely too high.

"We then discussed some of the other problems in connection with the pricing and selling of surplus machine tools owned by the government, pointing out the fact that many privately-owned plants are now being auctioned and the prices are often under the Clayton Formula.

"Some time ago AMTDA formulated a set of suggested procedures for the orderly disposal of government-owned surplus machines. As a result, we have prepared a sequence of procedures as our official recommen-

AIRWAY EXPANSION: ***The map shows existing and proposed air line routes operated by Canada's two large railway systems, The Canadian National Railways (TCA) and the Canadian Pacific Railways (CPA).***

dations to the SPA. Here they are:

"1. Permit all Federal Government departments to retain any and all machine tools they desire, within practical limits, for which they are now accountable, and immediately report the remainder as surplus, giving complete specifications, standard and special accessories, including name of manufacturer, number and size of machine, serial number, motors, controls and current, original consignee and present location.

"2. Permit private organizations who now have under their supervision government machines to immediately buy them, using the Clayton Formula for pricing, or report them as surplus and give complete specifications, as outlined under No. 1.

"3. Permit the Army, Navy, or any other Federal, State and municipal divisions to requisition whatever machines they think they may want for present, future or 'stand-by' needs from this surplus and immediately transfer those machines to that orgainzation 'as is'.

"4. Set aside in dead storage for an indefinite period between 33⅓ and 50 pct of the remaining standard machines as a protection for future requirements. These are as important as actual fighting equipment, in our program of national defense.

"5. Contact all the original manufacturers and advise them of the number of machines remaining, listed as 'surplus', offering them the privilege of buying on suitable terms any number of these machines within 60 days after being notified, at a price determined by the Clayton Formula, less an edequate discount, with the proviso that the manufacturer dispose of them through his regular channels.

"6. After the above operations are completed, compile a complete record of all remaining machines and classify for usability. Then provide centralized storage places and showrooms for those which can be used and scrap the remainder.

"7. Machines may be sold 'as is' by the RFC. They may be purchased by anyone for their own use, using the Clayton Formula. If sold through the efforts of an approved sales organization or individual, the RFC will carry the account and compensate the seller at the rate of 15 pct. Regular machine tool procedure shall be adhered to except there are to be no territory limitations.

"8. We recommend that the SPB give some price inducement to purchasers of government-owned machine tools for replacement, provided the purchased would agree to scrap an equivalent type and size machine tool which the purchaser has had in his possession for at least one year and which is being replaced.

"9. We recommend that the RFC and SPB form immediately a joint advisory committee consisting of representatives of the National Machine Tool Builders Assn., the Machinery Dealers National Assn., and the American Machine Tool Distributors Assn., to meet regularly in an advisory capacity."

Reports Substitution For Ferromanganese In Stainless Heats

Washington

• • • Cooperative tests with two steel mills have disclosed that pure electrolytic manganese, produced from low-grade domestic ores in a Bureau of Mines pilot plant at Boulder City, Nev., has definite advantages as a substitute for low-carbon ferromanganese in the manufacture of stainless steels, according to Dr. R. R. Sayers, director of the Bureau. The cooperating plants were the Rustless Iron & Steel Corp., of Baltimore, and the Universal-Cyclops Steel Corp., of Bridgeville, Pa.

At the Rustless plant, 403,000 pounds of electrolytic manganese was added to 1,596 heats of 22 different types of stainless steel. At the Universal-Cyclops plant, electrolytic manganese produced by the Bureau was used in 103 heats, largely limited to two types of stainless steel. These steels were being made into welding wire for the Army and Navy, and the specifications required extremely low maximums of phosphorus and carbon together with a relatively high manganese content.

Comparative heats using electrolytic manganese and low-carbon ferromanganese showed that there was no appreciable difference in the average recovery obtained from the two forms of manganese. Also, they proved decided advantages for electrolytic manganese in meeting the low maximum specifications for phosphorus and carbon.

At both plants, electrolytic manganese was found to offer operating advantages because of its purity and physical form. It can be stored in less space and may be weighed more conveniently and accurately than ferromanganese. Weighing 20 pct less than an equivalent addition of ferro, electrolytic manganese requires less time to weigh and shovel, melts in more rapidly, and thus reduces chilling of the metal.

A copy of Report of Investigations 3829, "Electrolytic Manganese in Stainless-Steel Tests at Rustless Steel Corp. and Universal-Cyclops Steel Corp.," by R. T. C. Rasmussen, may be obtained by writing to the Bureau of Mines, Department of the Interior, Washington 25, D. C.

COMING EVENTS

Dec. 3-4—Fourth Annual Conference, Steel Products, Warehouse Assn., Hotel Cleveland, Cleveland.

Dec. 3-5—SAE National Air Transport Engineering Meeting, Edgewater Beach Hotel, Chicago.

Dec. 4-5—Electric Furnace Section Institute of Mining & Metallurgical Engineers, Statler Hotel, Cleveland.

Dec. 5-7—Fiftieth Annual Meeting, National Assn. of Manufacturers, Waldorf-Astoria, New York.

Jan. 7-11, 1946—SAE Annual Meeting and Engineering Display, Book-Cadillac Hotel, Detroit.

Jan. 21-23—1946 Convention of Institute of Scrap Iron & Steel, Inc., Congress Hotel, Chicago.

Feb. 4-7—National Meeting, American Welding Society, Hotel Cleveland, Cleveland.

Feb. 4-8—National Metal Exposition, Public Auditorium, Cleveland.

Feb. 4-8—National Metal Congress, Public Auditorium, Cleveland.

Feb. 4-8—American Society for Metals, Statler Hotel, Cleveland.

Feb. 4-8—National Meeting, Iron and Steel Institute of Metals Div., American Institute of Mining and Metallurgical Engineers, Statler Hotel, Cleveland.

Feb. 6-8—American Industrial Radium and X-ray Society, Hollenden Hotel, Cleveland.

Feb. 25-28—Annual Meeting, American Institute of Mining and Metallurgical Engineers, Chicago.

Feb. 25-Mar. 1—Spring Meeting, American Society for Testing Materials, Pittsburgh.

Apr. 3-5—SAE National Aeronautical Meeting, Hotel New Yorker, New York.

Apr. 8-12—ASTE Exposition, Cleveland Public Auditorium, Cleveland.

Apr. 11-13—Spring Congress, Electrochemical Society, Inc., Birmingham, Ala.

Apr. 25-26—Twenty-ninth AIME Annual Open-Hearth Steel and Blast Furnace and Raw Materials Conferences, Chicago.

June 24-28—Forty-ninth Annual Meeting, American Society for Testing Materials, Buffalo.

Postwar Fontana Operation Depends on Lower Cost

Washington

• • • In a report to RFC on costs and postwar market prospects of Kaiser's Fontana Plant, Aurther G. McKee & Co. state that substantial reduction of costs in the departments now operating is a necessity for successful postwar operations, as these must produce economically the semi-finished products from which the finished products will be made. The total cost of ingots, it is said, must be reduced from about $29 to $22 if the McKee-estimated costs of manufacturing rolled products on a competitive basis are to be realized.

By JOHN ANTHONY

o o o

The report presents estimates by McKee engineers designed to establish the cost under assumed postwar conditions of construction of the present Fontana plant, and of facilities equivalent in capacity, and contains a study of the prospective profitability of the plant under postwar marketing conditions.

Equivalent plant cost data were requested by RFC where the present plant design, construction and equipment is not considered conducive to satisfactory operating cost. In complying with this requirement the engineers have assumed that the hypothetical equivalent plant would be built at Fontana, although it is possible that a site might have been found which would be more favorable to production and distribution costs, especially for postwar operations.

In making the estimates, therefore, an initial requisite was to determine whether or not Fontana was used to best advantage in general arrangement of the producing departments, shops and service facilities, the water, electric and gas lines, railroads and highways. By comparing the existing plant with a general plan based on the judgment and experience of the McKee engineers, it is apparent that the existing plant, the report says, has not been very closely integrated making the length of transportation and service lines much greater than necessary or desirable for minimum operation of the transportation and service facilities.

In analyzing present Fontana plant design, raw materials handling facilities are criticized by McKee engineers because an elaborate system of 39 belt conveyors has been substituted for the usual arrangement in which railroad tracks are superimposed on the furnace stock house which permits dumping direct from cars into the blast furnace bins. This is said to have resulted in high materials handling costs and has almost entirely prevented the use of blast furnace scrap, one of the most economic raw materials for production of pig iron in the Los Angeles area.

The low yield of furnace coke from Utah coal and the anticipated higher coke consumption of the Fontana furnace, the report stated, was apparently the justification for building a total of 90 ovens in two batteries. However, the plant is only being operated at 85 pct of capacity and experience with Utah coals has demonstrated that 81 ovens would be sufficient for the furnace requirements when a small amount of low volatile blending materials is added to the coal mixture. Equivalent plant estimates are based on a battery of 81 ovens.

The power house servicing the steam boilers used for blast and for process purposes are considered by McKee to be much larger and more costly than required by the limited

Fontana Plant Costs

	Actual Cost of Present Plant*	McKee Replacement Cost of Present Plant	McKee Cost of Equivalent Plant
Direct Costs			
Raw materials, Blast Furnace	$7,819,659	$5,705,000	$5,824,000
Ore screening and crushing	377,618	343,000	.....
Rotary car dumper	403,772	359,000	.....
Coke plant	7,579,598	6,135,000	5,600,000
Tar plant	497,396	424,000	424,000
Power plant	3,321,091	2,237,000	1,598,000
Openhearth	8,883,633	7,430,000	7,000,000
Openhearth addition, 10-ton electromelt furnace	3,610,783	3,100,000	2,832,000
Openhearth improvements	68,655	67,000	67,000
Soaking pits and stripper	1,874,303	1,605,000	1,484,000
Soaking pit additions	759,109	650,000	595,000
Preheating pits	161,913	146,000	146,000
Plate mill	11,544,761	8,026,000	8,163,000
Carrier for relieving spindle	2,873	6,000	6,000
Yard development	6,343,830	4,780,000	3,800,000
Yard development	1,127,012	890,000	683,000
Buildings and shops	3,669,813	2,908,000	2,363,000
20-ton cupola	159,799	146,000	146,000
Buildings and shops addition	997,899	787,000	680,000
Slow cooling ingot pits	132,804	118,000	95,000
Alloy finishing facilities	1,202,521	1,033,000	1,033,000
Merchant mill	7,386,427	5,880,000	5,880,000
Structural mill	12,550,364	9,244,000	6,385,000
Vulcan ore mine	848,162	764,000	764,000
Sunnyside coal mine	1,166,458	1,123,000	1,123,000
Moss clay pits	.....	7,000	7,000
Total direct costs	$82,490,253	$63,913,000	$56,698,000
Indirect Costs	$ 9,532,110	$ 4,387,000	$ 3,900,000
Total direct and indirect costs	$92,022,363	$68,300,000	$60,598,000
Additional Miscellaneous Costs			
Exploration and testing	$ 229,395	$ 229,395	$ 229,395
Spare parts project I	596,246	600,000	500,000
Spare parts Project III	655,154	630,000	575,000
Cost of abandonments I	197,024	.....	.....
Cost of abandonments III	571	.....	.....
Loss through sale of assets I	19,376	.....	.....
Loss through sale of assets III	344	.....	.....
Sub-total	$ 1,698,110	$ 1,459,395	$ 1,304,395
Property and Mines			
Plant site	$ 311,169	$ 311,169	$ 311,169
Vulcan ore mine	144,357	144,357	144,357
Moss clay pit	7,580	7,580	7,580
Eagle Mountain ore mine	1,003,489	1,003,489	1,003,489
Sub-total	$ 1,466,595	$ 1,466,595	$ 1,466,395
Grand Total All Costs	$95,187,068	$71,225,990	$63,368,990

*—Costs as obtained from Kaiser budget report dated Mar. 31, 1945.

facilities. For equivalent plant the projected area of the building has been reduced by 40 pct. Likewise, wartime conditions of construction are considered to have caused the installation of larger and more expensive boilers and blowers than warranted for postwar operations.

Equivalent plant design contemplates a slabbing-blooming mill to permit rolling plates from slabs instead of slab ingots, practice which requires bottom casting of ingots necessitating considerable space in the openhearth building for preparation of runners and fountains, as well as for the preparation of molds.

For previous Fontana news see THE IRON AGE, *Nov. 15, p. 112 and June 7, p. 111*

The ingot mold stripper is located at a distance from the ingot soaking pits. A combination of the two facilities in a single building would be more satisfactory for handling both molds and ingots in the opinion of McKee engineers, and equivalent plant is predicated on that arrangement.

In a like manner the report goes on to analyze and recommend equivalent equipment for the soaking pit and stripper building, for the plate mill which is said to be poorly suited for producing plate at low cost or of high quality. The McKee engineers consider that the yard facilities at Fontana are costly to operate since the plant is spread over such a large area.

In making estimates of equivalent plant the McKee engineers have not omitted any existing facilities even though all may not be essential to or desirable for postwar operations. For example, it is said the availability and comparably low cost of steel scrap in the Los Angeles district throw some doubt on whether the coke ovens and blast furnace were justifiable even for war emergency purposes. Again there does not seem to have been justification for the construction of the merchant bar mill since the capacity of other bar mills on the Coast is in excess of normal demands for these products.

In a study of prospective postwar products for the two DPC-owned plants at Fontana and Geneva, the report states that present facilities for production and consumption in the West provide for about 1,609,000 tons per yr for which about 2.1 million tons of ingots would be required. This represents only 45 pct of current steelmaking capacities. Unless facilities are installed for the production of light flat-rolled products, pipes, tubes and miscellaneous secondary steel products, 55 pct of the steel and 45 pct of pig iron capacities of the West would be idle, it is said.

In designating optimum production schedules for the Fontana and Geneva plants a number of important factors have been given primary consideration. Among these are: (a) margin between cost and selling price, (b) maximum utilization of existing facilities, (c) minimum cost of additional facilities, (d) avoidance of competition between Fontana and Geneva, (e) preference to products for which manufacturing capacity in the West is deficient.

The bar mill at Fontana could be modified to roll skelp for making pipe up to about 5 in. in diameter, and the structural mills at either plant could roll blanks for the production of pipe by the seamless process.

The bar mill at Fontana could be equipped to roll strip up to about 18 in. in width and the plate mills at both plants, by changes to existing equipment and the addition of others, could be converted for the hot-rolling of strip sufficiently wide for cold-rolling into sheets and or tinplate. However, it will cost about $14 million to equip for wide strip rolling at Fontana as compared with about $5 million for wide strip rolling at Geneva.

In the first schedule, or Case I, an effort was made to divide flat-rolling as well as pipe making between the two plants, assigning welded pipe and tinplate to Fontana; strip, sheets and seamless tubing to Geneva. The chief objection to this schedule is that it does not provide a satisfactory return on the large investment required for new facilities at either plant.

In Case IV the strip mill for Fontana is omitted and production of sheets and tinplate concentrated at Geneva where the cost of the required new facilities will be less. The larger of the electrically welded tube mills which had been included for Fontana, is also omitted to avoid production of sizes competitive with Geneva, but a

Hypothetical Production Schedules for Fontana and Geneva
Thousands of Net Tons

	Case I		Case IV		Case V		Case VI		Case VII	
	F	G	F	G	F	G	F	G	F	G
Plates	100	100	150	100	150	100	150	100	150	—
Strip	40	—	20	—	20	—	20	—	50	—
Strip and sheets	—	400	—	260	—	75	—	75	—	—
Tinplate	226	—	—	280	—	280	—	280	240	—
Fretz-Moon pipe	—	—	80	—	80	—	80	—	80	—
Electric welded pipe	100	—	40	—	40	—	40	150	125	—
Seamless pipe	—	150	—	150	—	150	—	—	—	—
Structurals	—	200	100	—	100	—	100	—	—	—
Hot-rolled bars										
Carbon	—	—	50	—	50	—	50	—	—	—
Alloy	20	—	20	—	20	—	20	—	20	—
Cold-drawn bars	—	—	20	—	20	—	20	—	20	—
Billets	—	96	40	22	40	30	40	30	—	—
Totals	486	946	520	812	520	635	520	635	685	—
Pct of capacity	100	100	100	90	100	70	100	68	134	None

Comparative Profitability of Proposed Schedules

	Cost of New Facilities	Potential Annual Manufacturing Profits: Amount	Potential Annual Manufacturing Profits: Pct of New Investment
Case I—Fontana	$31,700,000	$12,260,000	38.7
Geneva	34,750,000	6,991,000	20.1
Combined plants	$66,450,000	$19,251,000	29.0
Case IV—Fontana	$ 9,150,000	$ 7,878,400	86.1
Geneva	52,500,000	12,404,000	23.6
Combined plants	$61,650,000	$20,282,400	32.9
Case V—Fontana	$ 9,150,000	$ 7,878,400	86.1
Geneva	37,250,000	11,222,400	30.2
Combined plants	$46,400,000	$19,100,800	41.2
Case VI—Fontana	$ 9,150,000	$ 7,878,400	86.1
Geneva	30,000,000	11,222,400	37.4
Combined plants	$39,150,000	$19,100,800	48.8
Case VII—Fontana	$43,050,000	$17,909,100	41.6
Geneva	None	None	—
Combined plants	$43,050,000	$17,909,100	41.6

Fretz-Moon tube mill is added to cover a wider variety of pipe in the smaller sizes.

In this schedule the return on the new investment for Fontana is considerably improved over Case I and for Geneva is slightly improved. The combined investments, however, are not greatly reduced.

In Case V sheet mills are omitted from the picture at Geneva to reduce the total investment requirements and partly to avoid interference with sheet production on the Coast. The rolling of sheet breakdowns at Geneva, however, is contemplated, in the belief that these could be sold to the existing sheet finishing mills with some advantage to them as well as to Geneva. These changes substantially reduce the combined investments and considerably improve the return on them.

In Case VI the combined investments are further reduced by substituting an electrically welded tube mill for the seamless mill at Geneva. Otherwise the schedule in Case VI is the same as for Case V. By this means the return on the combined investments is further increased. However, decision as to which type of tube mill would be put into Geneva, should probably be left to the company which leases or buys the plant. Some of the producers favor making seamless and others electrically welded. Seamless would probably be preferred by consumers for most purposes and insisted upon for deep casing and certain other uses. However, electrically welded pipe is approved by API-ASME and ASME codes for all of the services in which seamless is used except for drill pipe, and electric weld has the advantage to the consumer of being somewhat lower in price. Case VI in no way affects the situation at Fontana.

Case VII is of interest only in the event that operations at Geneva should be discontinued. In support of such possibility there may be mentioned the low margin of profitability at Geneva in any of the schedules that have been studied until now, although the findings of this report must not be considered final so far as Geneva is concerned. Another argument that has been advanced for closing Geneva is that, being equipped especially for the production of plates and shell steel, it should be preserved intact as a war emergency plant. Its protected location and the limited amount of proved iron ore reserves within economical transportation distance of Geneva are circumstances that lend strength to this viewpoint. Conversion of the 132 in. plate mill at Geneva for strip rolilng will reduce the size and amounts of plates that can be rolled and finished at that plant. Also, it would be easier to market the 685,000 tons of Case VII than the 1,155,000 tons of Case V, and cause less disturbance to the business of the present suppliers.

The comparisons that have been made indicate that of the several schedules considered Case V represents the one most satisfactory for initial postwar operations when judged by return on the investment in new facilities, cost of additional facilities, and avoidance of competition between Fontana and Geneva. Other considerations to be examined are those comparing the operations at Fontana and Geneva with the productive deficiencies of the present western plants and those dealing with the extent to which production schedules of Case V would utilize the existing productive facilities at Fontana and Geneva.

In estimating postwar operating costs, two basic computations have been made, to show potential earnings when operating at 100 pct and at 60 pct of the proposed production schedule. The latter reflects the reduction in earnings due to higher operating costs as well as those due to smaller volume of sales. For operations from 100 pct down to 80 pct of the schedule it may be assumed that production costs will not be substantially changed and that earnings will vary directly with sales. For rates between 60 and 80 pct, earnings may be approximated by interpolation. These basic computations indicate that gross operating earnings at full schedule should be approximately $10 million and at 60 pct of schedule, approximately $5 million annually.

It is extremely difficult to predict the rate of postwar operations for Fontana, the report states. The demand for iron and steel is closely associated with and particularly sensitive to the general business conditions of the country as a whole and has always fluctuated widely. It has also, at times, fluctuated sharply. Operations during the past 25 yr have ranged from 19.5 pct of rated capacity in 1932 to practically 100 pct during the recent war years. The average for 16 peacetime years, 1926 to 1941 inclusive, as reported by the American Iron and Steel Institute, was 62.1 pct, but these figures are misleading if it is not understood that the listed capacities of all plants, old, new, obsolete and modern, and in unfavorable as well as favorable locations, have been included. Plants that are well placed in respect to raw materials and markets, that have modern and completely integrated production facilities, and that make a high percentage of finished rather than semi-finished products, have been able to operate at a higher rate than the average. The Fontana plant would have all these advantages and one other in that it would be the only fully integrated and modern plant on the Pacific Coast. Especially in its ability to make prompt deliveries, it should have an advantage over eastern producers during periods of business depression.

On the negative side, Kaiser Co. will be newcomers in a highly competitive business and in an industry which in peacetimes has had, for many years, a great surplus of capacity. Peacetime business will have to be taken from producers who, although their plants for the most part are remotely located from the western area, have established warehouses and affiliations with secondary manufacturers, jobbers and distributors that strengthen their initial postwar marketing position.

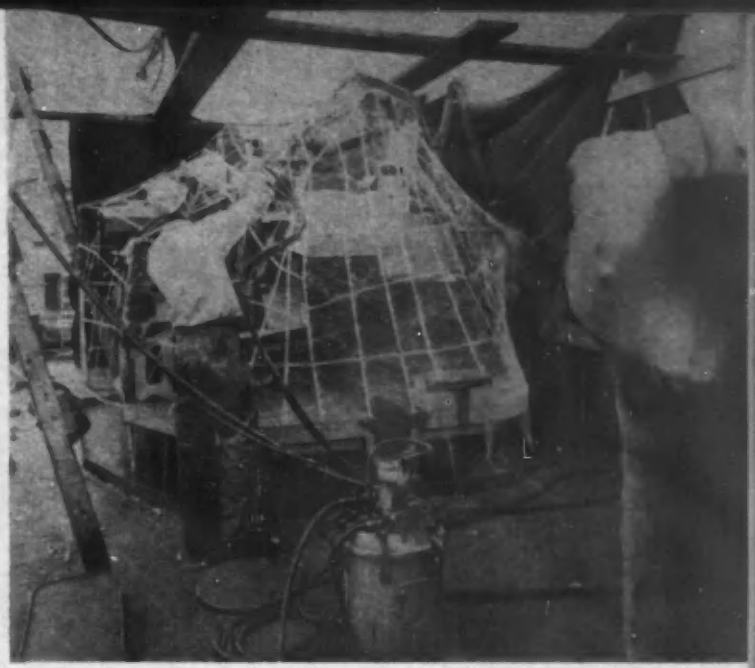
Recommended Production Schedule for Fontana—Case V

	Net Tons Per Yr
Plates	150,000
Structurals	100,000
Fretz-Moon black pipe	30,000
Fretz-Moon galvanized pipe	50,000
Electric welded black pipe	30,000
Electric welded galvanized pipe	10,000
Hot-rolled carbon steel bars	50,000
Hot-rolled alloy steel bars	20,000
Cold-finished carbon steel bars	18,000
Cold-finished alloy steel bars	2,000
Hot-rolled strip	8,000
Cold-rolled strip	12,000
Rerolling and forging billets	40,000
Total finished products	520,000

Fontana Modification Cost Estimate

Manufacture of New Products Changes and Additions	
Merchant bar mill alterations	$ 750,000
Strip cold-rolling mill	1,350,000
Cold-drawing equipment	300,000
Fretz-Moon and electric weld tube mills	5,100,000
Structural mill alterations	550,000
Utilities and supplementary services	600,000
Total	$ 8,650,000
Reduction of Manufacturing Costs, Changes and Additions	
Trestle for unloading scrap and miscellaneous blast-furnace material	$ 125,000
Gas mixing station (funds previously provided)	.....
Openhearth lime burning kilns	350,000
Alterations to 36-in. mill	1,350,000
Warehouse for finished products	650,000
Development of Silver Lake ore mine	375,000
Total	$ 2,850,000
Total all changes and additions	$11,500,000

Moisture-Proof Covering to Protect Navy Materiel



FIRST COAT: *The first coat of plastic film is sprayed over the scotch tape network, forming a base for later and more liquid coatings.*

Washington

• • • **Strippable film, newest covering developed, will be used by the Navy in protecting ordnance equipment from the damaging effects of weather whose moisture causes corrosion. Where practical, parts formerly were packed in heavy grease which protected and concealed the equipment so that its condition was not apparent until the coating had been removed. Further, the grease had to cleaned off before the equipment could be used.**

Tests on preservation of ordnance equipment on board inactive vessels have been underway for many months at the Philadelphia Navy Yard and aboard the USS Holder, a former destroyer escort.

Some of the Navy's biggest guns are built inside turrets which can be sealed to keep moisture out. To dry the guns, dry air is forced through holes in the deck into the turrets from the interior of the ship.

The problem isn't quite so simple for the open type of gun mounts. Before being dried out, they must be encased in moisture-tight coverings.

Strippable film is a plastic sprayed over a gun mount. Scotch tape, connecting the outer projections of the gun mounts, is attached to the equipment to support the outline of the package as the preliminary step in the application of the covering. A web coat sprayed over this network forms the base for the later and more liquid coatings. The scotch tape network makes a neater package, with fewer sharp points, and also reduces the exposed area of the completed package, one factor in reducing the amount of moisture vapor entering the package.

Equipment covered with the strippable film may be dried by air from the ship's interior as in the case of the turrets, or a dehumidifying agent, such as silica gel, is deposited inside the package to insure continued low humidity. Through a window cut in the package and then sealed, a recording instrument indicates the humidity inside, as a guide to the condition of the equipment.

The strippable coating (spray type) Navy Spec. OS 3602, was developed at the Naval Ordnance Laboratory, Silver Springs, Md. It is a vinyl resin with a ketone thinner. It does not stick to metal and can be very easily removed by cutting through the plastic layer and peeling it off. A 3-in. gun and mount covered with the film has been completely stripped by one man in 90 sec. The material has the unusual characteristic that by spraying, it can bridge over a 16-in. opening.

The plastic covering is a quick, easy, and efficient method of getting the guns of the inactive fleet under cover as soon as they are tied up at permanent anchorages. For permanent storage it is expected that prefabricated sheet metal protective structures will be built, so air tight they allow virtually no entrance of moisture vapor. This latter method, described in THE IRON AGE of Aug. 16, 1945, page 104F, has been developed by Army Ordnance.

UNDER COVER: *Wrapped in their plastic "cocoons", three gun mounts on board the USS HOLDER prepare to weather the elements.*

Industrial Briefs...

• OPENS OFFICE — Announcement of the opening of a sales-engineering office of Tocco Div. of the Ohio Crankshaft Co., Indianapolis, under the direction of James W. Calloway, was made recently.

• BUYS TOOL FIRM—The Cincinnati Lathe & Tool Co. has been purchased by the Cincinnati Milling Machine Tool Co. Millard Romain, an executive of Milling Machine, will be president of the new company. E. W. Mueller will be Secretary and Treasurer.

• BUYS PLANT—The American Machine & Foundry Co. has purchased the government-owned plant formerly occupied by the Buffalo Arms Corp. in Cheektowaga, N. Y., for $1,500,000 from the RFC and plans to spend another $1,500,000 for machinery and equipment.

• TOOL DIE FIRM—The Super Tool & Die Corp. has been organized at Milwaukee with headquarters in charge of A. W. Richter, Caswell Bldg., Milwaukee 3.

• NEW COMPANY—Bert Carpenter Co. has been organized to serve as machine tool distributors in Michigan and Northern Ohio, with headquarters in Detroit.

• BRANCH OFFICES—The Middletown Iron & Steel Div. of the David J. Joseph Co., Cincinnati, has opened branch offices at St. Louis and Birmingham. The St. Louis office will be under the direction of Delmar C. Lee, and the Birmingham office under Mayo Fechheimer.

• BUYS SHIP YARDS—Nottingham Steel Co. purchased the Cleveland yards of the American Shipbuilding Co. for $142,000. Plans for utilizing the property include expenditure of about $75,000 on the largest building which will be used for a warehouse, with space for storage of 15,000 tons of flat rolled products.

• REPLACES OLD PLANT—A daylight structure of steel and concrete will replace the present 75-yr-old plant of E. C. Atkins & Co., Indianapolis. Present construction plans involve an expenditure of $1,500,000, but this figure may later reach or exceed $2,000,000, according to the company.

• PLANT EXPANSION — Tube Turns, Inc., Louisville, Ky., plans to lease $3,000,000 worth of DPC equipment from RFC, which had been installed for war work, and also to purchase additional equipment costing $500,000, to round out the company's production facilities.

• REYNOLDS WITHDRAWS — Reynolds Metals Co. has withdrawn bids on a foundry which it operated during the war as well as other government property in East Springfield, Mass., and will transfer its activities there to Louisville, Ky.

• FIRE DAMAGE—A larger one-story building at the Clyde Porcelain Steel Co., Clyde, Ohio, will be erected to replace a portion of the No. 1 plant structure which was destroyed by fire. The new building will contain 190,000 sq ft of floor space.

• HIRES RETURNING VETS—Inland Steel Co. hired, through October, 1274 returning veterans, of which 617 were former employees. During October 202 were hired of which 114 had been employed by the company before joining the service.

• ACQUISITION—Curtiss-Wright Corp. has acquired the Marquette Metal Products Co., of Cleveland.

• DREDGES FOR HOLLAND—The visit of Dutch officials to Milwaukee revealed that Bucyrus-Erie Co. there had received an order for a number of sea-going dredges to be used in connection with hulls being built by the Tampa Shipbuilding & Engineering Co., Tampa, Fla.

SPA Plans Regional Disposal Agencies

Washington

• • • **Appointment of a government requirements officer in each central and regional office of Surplus Property Disposial Agencies is ordered in a revised regulation issued by the Surplus Property Administration.**

The order, contained in revised Regulation 2, declares that such officer's duties shall be:

1. Transmitting to government agencies and state and local governments information concerning Surplus Property which is or may become available for disposal.

2. Assisting in programming sales or offerings in such a manner as to afford government agencies and state and local governments an opportunity to purchase any and all kinds of property they desire.

3. Ascertaining the probable needs for all kinds of property of government agencies and state and local governments within the region served by each regional office to the end that the reservations established under 8302.5 may be adequate to supply the probable needs of government agencies and state and local governments within the region served by the office.

4. Cooperating with such advisory committees as the Administrator may appoint.

5. Taking all other necessary or desirable steps to see that all requirements of this part are complied with.

"This plan has been devised in an effort to make it as easy as possible for Federal, State and local governments, which have first and second priority under the Surplus Property Act, to acquire surplus government goods," W. Stuart Symington, Surplus Property Administrator declared.

Reports Peak Production

Hamilton, Ont.

• • • **National Steel Car Corp. has sufficient orders on its books for Canadian and foreign railroads to keep its plant here at full production to the end of 1946, according to Robert F. Hart, president. At the present time the company is working on an order for 2400 cars to be shipped to India, while an order for 2100 cars for Belgium will be completed by the end of April. Additional large orders from the Canadian Pacific and the Canadian National Railways**

Soviet Steel Industry Shifted Eastward During the War

New York

• • • Details of wartime changes in U.S.S.R. ferrous metallurgy were presented by P. Korobov, deputy commissar for ferrous metallurgy, in the first issue of the Russian language magazine *Planned Economy* published since its curtailment during the war. Mr. Korobov states that Soviet ferrous metallurgy during the war has had to solve extremely difficult problems. Before the war, the Ukraine produced about one-half of total steel and rolled steel of the Soviet Union. This southern production was lost during the war as a result of the German advance and, in addition, temporary cessation of production occurred at several important metallurgical plants in the central industrial area in 1941. Total dependency had to be placed on the metallurgical industry of the Soviet East. Eastern metallurgy, which was created during the Five-Year Plan, in spite of many difficulties solved its problems and filled the needs of the country for ferrous metals. In July 1944, as compared with July 1943, pig iron production had increased 34 pct, steel production 28 pct, rolled steel 31 pct, coke 34 pct, and iron ore 20 pct. Success was due to the fact that the Soviet Government and the Communist Party paid a great deal of attention to ferrous metallurgy during the war. Germany based its plans for defeat of the Soviet Union on the hope that Soviet industry could not function without the steel production of the Soviet Ukraine.

In the East, factories produced before the war mostly ordinary rolled steel. A large part of this capacity had to be converted to the production of quality and high quality steel during wartime. This necessitated a complete review of the technology of production of quality and high quality steel and the development of new methods. Of special difficulty was the problem of converting 185 ton openhearth furnaces at larger eastern enterprises to the production of alloy steel. The whole organization of production at these openhearths had to be altered and the installation of additional equipment was required. Molds and buckets had to be changed

(CONTINUED ON PAGE 129)

Ural Metallurgical and Iron Mining Enterprises in 1941 From Soviet Sources

Plant	Location	Product	Origin of Ore	1000 kw Power Station
Alapayevsk	100 km E. of N. Tagil	Charcoal pig	own	P. S. 00
Arty	35 km W. of Mikhailovski	.....	own	P. S. 0.5
Asha	between Cheliabinsk and Ufa	charcoal pig	Bakal	P. S. 5-10
Auerbakh	.....	.....	Own	.....
Bakal	75 km S. of Berdyaush	.....	mine	.....
Beloretsk	150 km of Yuryuzan	coke pig	own	P. S. 5-10
Blagodat	near N. Tagil	.....	own	.....
Chelyabinsk	.....	ferroalloys	Bakal	P. S. 200
Chermoz	on Kama R.	pig	.....	P. S. 1-3
Chusovoi	150 km E. of Molotov	coke pig	Chusinsk	P. S. 0.5
Dobryansk	.....	only roll. m.	.....	.....
Kama-Vyshersk	.....	.....	own	.....
Katav-Ivanovsk	near Beloretsk	coke pig	Bakal	P. S. 1-3
Khalilovo	near Orsk	ferroalloys	own	.....
Kusa	30 km N. W. of Zlatoust	charcoal pig	own	P. S. 0.5
Kushva	8 km of Blagodat	coke pig	Blagodat	P. S. 10-25
Kusinsk	18 km N. of Zlatoüst	.....	ore Fe-Ni-Cr-Vn	.....
Lysva	150 km E. of Molotov	.....	.....	P. S. 3-5
Magnitogorsk	on Ural R.	coke pig	own	.....
Maikor	on Kama R.	charcoal pig	Bakal	.....
Mikhailovski	25 km S. of N. Sergi	.....	.....	P. S. 0.5
Minyar	between Ufa and Chelyab	pig	own	P. S. 3-5
Neivo-Shatansk	Sverdlovsk district	pig	Alapayev	.....
Nevyansk	.....	pig	.....	.....
Nizhniaya Salda	on Alapayevsk R. R.	pig	.....	P. S. 0.5-1
Nizhne-Tura	25 km N. of Krasnouralsk	.....	.....	.....
Nizhnii Sergi	100 km W. of Sverdlovsk	charcoal pig	.....	P. S. 0.5
Nizhnii Tagil	North Urals	coke pig	Vysokaya, Blagodat	P. S. 50-100+
Nizhni Ufalei	22 km of Verkh. Ufalei	.....	.....	.....
Novo-Uralsk	.....	pipes	.....	.....
Nytva	North of Molotov	steel	.....	P. S. 1-3
Pervo-Uralsk	50 km W. of Sverdlovsk	steel pipes	.....	P. S. 5-10
Satka	between Bakal and Berdyoush	charcoal pig	.....	.....
Serov	.....	charcoal pig	own	P. S. 50
Sinara	.....	pig, pipes	own	.....
Tirlyanskoye	30 km N. of Beloretsk	roll. m.	.....	P. S. 1-3
Verkhne Sinyachikha	10 km N. of Alapayevsk	coke pig	.....	.....
Verkhnoture	between Serov and N. Tagil	.....	.....	P. S. 0.5
Verkhnii Isetskii	near Sverdlovsk	steel	.....	.....
Verkhniaya Salda	10 km E. of N. Salda	roll. m.	.....	P. S. 0.5-1
Verkhnii Sergi	bear Sverdlovsk	wire	.....	.....
Verkhnii Ufalei	on Chelyab-Sverdlovsk R. R.	coke pig	.....	.....
Vysokaya	near Nizh. Tagil	ore to N. T.	.....	.....
Yuryuzan	on Chelyab-Ufa R. R.	charcoal pig	.....	P. S. 0.5-1
Zingazino-Kanovarsk	Bashkiria	coke pig	.....	.....
Zlatoüst	.....	electric steel	Bakal	P. S. 10-25

MACHINE TOOLS

. . . News and Market Activities

Approves Proposal To Allow Tool Dealers To Aid in Surplus Sales

Chicago

• • • **Regulations allowing** machine tool dealers to participate in sale of surplus machine tools have been officially approved by Reconstruction Finance Corp., now the sales agency, and should be announced shortly, W. Stuart Symington, Surplus Property Administrator, confirmed last week

For additional machine tool news see pp. 99 and 100.

before the Chicago Assn. of Commerce.

That such a proposal was "in the works" has been known for some time, but Mr. Symington's announcement marks the first official indication that certain objections within RFC have been overcome and that the dealer selling program definitely will be official.

"We are all for it," Mr. Symington declared. "Our biggest problem is to secure additional sales outlets and this will give them to us."

Other unofficial sources have indicated that dealers would be allowed to sell surplus tools held for disposal by RFC on a commission basis, with a probable commission of 12½ pct on all types of tools. Dealers would be licensed to participate in the program, and would be required to sell the tools at Clayton formula prices. Drafting of dealer licensing provisions of the regulation is said to be currently in progress, and when this is completed, the program will be officially promulgated.

Mr. Symington said that other proposals for giving the individual manufacturer exclusive disposal rights on surplus products of his manufacture were unacceptable because of Surplus Property Act provisions giving purchase priorities to federal agencies, governmental subdivisions, veterans and other classes.

Surplus property of all types offered for sale this year by the government will total $32 billion, of which $4 billion will be materials and machine tools, the surplus administrator predicted. Machine tools alone will amount to only $140 million this year, but vastly greater quantities are in inventory and will be offered later.

RFC will be charged with 90 pct of the surplus expected to be disposed of this year.

"When in doubt — sell" was Mr. Symington's statement of policy on the question of withholding surpluses from the market. He reasoned that the value of surplus items will decrease constantly as time goes on, and that the impact on competitive markets will be greater.

"Industrial production plants, tools, machines and consumer goods can be valuable now in relieving inflationary pressure," he said.

He assured business, however, that disposal agencies will take into account impact of disposal of various products on the industries by which they were produced.

Mr. Symington acknowledged that the Surplus Property Act was organically unsound as it affects veterans' priorities, but said that the principal operational problem of disposal agencies is field distribution. Efficient functioning and morale in disposal agencies were cited as important factors. Total lack of inventory control, both as to condition and amounts of surplus items was cited as a current handicap.

Answering charges that shipments were delayed on surplus which had been sold, particularly in consumers' goods, he stated that disposal agencies now indicate that they are shipping merchandise within 5 to 10 days after sale.

o o o

Shipments of Machine Tools Down; Heavy 1946 Demand Seen

Washington

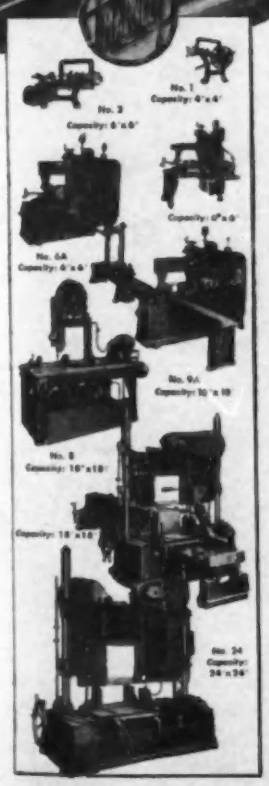
• • • **Reports to the Bureau** of the Census by 21 plants, comprising 42 pct of the prewar industry, showed that September shipments of machine tools were down more than 40 pct from the first quarter average monthly total. The sharp decline in shipments was due to the almost complete termination of direct munitions production.

The Bureau pointed out that while the bulk of the output of the reporting plants during the war was in their prewar line of machine tools and allied products, manufactured at a greatly expanded rate for both military and civilian customers, some plants added the production of special products for the military, such as aircraft parts, motors, transmissions, gun mounts, superchargers and radar. With the cancellation of most of the military contracts, it was stated, production of machine tools for reconversion has been accelerated, and shipments in September were within 25 pct of the rate in the first quarter of 1945. The reporting firms, in total, the Bureau said, expected little change in shipments during the next nine months, their forecasts showing June, 1946, output only slightly above the current rate, but more than double the 1939 rate.

"Because of the long time required to complete the products of this industry, employment is an important measure of activity," the Bureau said. "That a considerable part of the present work is in anticipation of future shipments is shown by the fact that employment in the reporting firms declined less than 20 pct from the beginning of the year to September. The slight increase in output now forecast will be coupled with a small decrease in employment, according to the current estimates. Despite this decrease, employment in June 1946 will still be two-thirds above the average for 1939.

"Within the total figures, there are important plant variations. Some firms, changing from military to civilian specifications, have experienced sharp drops in activity, but expect substantial gains next year. Others anticipate declines next year after reconversion orders are filled. A heavy demand is foreseen for the products of this industry, including foreign rehabilitation needs as well as domestic orders.

"In any event, the reporting firms have 5 to 6 months' unfilled orders at current operating rates. The potential impact of the disposal of government machine tools surpluses is still an area of uncertainty, however."



Fastest Saws Give Fastest Service

With these four modern MARVEL SAWS, the Hamilton Steel Co. of Cleveland is building a reputation for fast service on orders for accurately cut lengths and pieces. They use a Universal No. 8 MARVEL Metal-cutting Band Saw for the big work (up to 18" x 18"), for angle cuts (at any angle in a 180° radius), for notching, mitering and roughing to size and shape. For high speed cutting-off from bar stock up to 10" x 10", they have three No. 9A MARVEL Production Saws. These "fastest saws built" are used for cutting-off single pieces, or with their automatic bar-push-ups, for automatically reducing single or nested bars to slices (as gear blanks) or identical lengths, faster than is possible, with equal accuracy by any other method. With 9 distinct types of MARVEL Metal-cutting Saws; with the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades; and, with MARVEL Band Saw Blades, the MARVEL System of Metal Sawing has a better way for doing innumerable metal-cutting jobs. If you have a difficult metal sawing problem or just want a saw, MARVEL is your logical source. Write us or check with your local MARVEL Distributor.

For quick reference, see our section in Sweet's File—Mechanical Industries, or write for catalog.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. **Chicago 39, U.S.A.**

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

NON-FERROUS METALS

. . . News and Market Activities

Olin Will Not Lease Or Buy Tacoma Plant

East Alton, Ill.

• • • **John M. Olin,** president of Olin Industries, Inc., has announced that his company cannot at this time purchase or lease the Tacoma aluminum plant which it operated for the government during the war.

John M. Olin

This announcement was made following an exchange of telegrams with the Office of Defense Plants of RFC, and coincides with the closing down of the Tacoma plant. All operations are expected to be terminated by the end of November.

"The future of the commercial aluminum industry is too uncertain at this time to justify us to assume the enormous risks involved," Mr. Olin said in explaining the reasons for the action. "Statistics now at hand show a large amount of both primary and secondary aluminum in inventory and present manufacturing facilities far beyond estimated postwar requirements. In the face of these two facts, it would be virtually impossible for a new commercial producer promptly to develop the necessary market for his products.

"Moreover, it is our opinion that only a company which is fully integrated could enter the aluminum industry as a permanent venture. The present operating procedure of the industry demands that any company entering the industry should have ore deposits available of the proper quantity, quality and cost together with facilities for the production of its own alumina, reduction facilities for the production of metal, and undoubtedly facilities for fabrication. In fact, fabricating facilities might well be the logical starting point so as to develop a customer acceptance and volume prior to and in anticipation of integrating from the ore upward. The Tacoma plant, which has been operated as the Aluminum Div. of Olin Industries, Inc., produced aluminum from alumina, which is of course only one step in an integrated production chain."

The Tacoma plant has been in operation since September 1942, and has an annual capacity of approximately 40 million lb. The plant used the Soderberg continuous anode process and produced a high quality product of approximately 99.75 pct pure aluminum.

•

Tungsten Tool Steels Overtaking Molybdenum

New York

• • • **Tungsten high speed** tool steel which had been replaced very largely by the tool steels alloyed with molybdenum during the war is reported in the 1944 Minerals Yearbook chapter preprint on Tungsten to have come back into wide use when tungsten controls were removed at the end of 1943. Nevertheless, the molybdenum type steel, especially the so-called "6-6", 6 pct molybdenum and 6 pct tungsten, tool steel, will undoubtedly retain certain of its gains, says Hubert W. Davis, the author of the chapter.

Molybdenum-type tool steels, however, have to be especially heat treated, and many of the smaller users do not have the facilities for doing this. These consumers therefore will revert to using tungsten type tool steels.

The use of tungsten carbide and of stellite, a cobalt-chromium-tungsten alloy, for cutting tools, which increased rapidly during the war, is expected to continue to develop.

To what extent the United States will supply its needs for tungsten after the war will, of course, depend much upon the price. Stimulated by increased needs and higher prices, domestic production gained phenomenally during the war. However, upon withdrawal of the premium price paid to certain producers by the Office of Metals Reserve, the high-cost operating mines were closed. Nevertheless, certain well-equipped domestic mines are likely to continue producing after V-J day, and their combined output should make the United States less dependent on foreign ores than before the war, provided of course that the present duty is not substantially reduced.

Despite the duty, however, postwar domestic production, as in the past, will probably be inadequate to meet home demands, and imports will be necessary. For several years before the war, China and the Malay States were the chief sources of imports of tungsten, and economic factors, such as size of deposits, richness of ore, and production costs, favor these countries to regain their prewar market in this country. With regard to South America, where production was increased greatly in World War II as in World War I, it is likely that the postwar output will follow the pattern after World War I and decline substantially.

•

Nickel Scrap Drops; Aluminum Price Firm

New York

• • • **Scrap metals** continue strong here with copper, copper alloys, and lead holding firm at ceiling prices but with ingot producers able to fill their needs in all metals.

The aluminum scrap market is being supported very largely by the SPA floor under prices by which a graduated scale topped by 6¢ per lb. for segregated scrap has been established as minimum selling prices for government aluminum inventories. The trade reports that there are many thousands of tons of contract termination scrap in government storage.

The market for nickel has softened somewhat and nickel scrap is selling at 3¢ below the ceiling at 23¢ per lb.

OPA control of aluminum scrap and nickel scrap was dropped last week.

•

Limits Cadmium Receipts

Washington

• • • **Attributing its action** to a tighter supply situation CPA has placed a 45-day limitation on the receipts by users of metallic cadmium, balls, sticks, slabs and anodes. Including other products also reported to be scarce, CPA took this action in revising inventory control rules through changes in tables 1 and 3 of Priorities Regulation 32.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars, per lb. contained Be.	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$90-$100
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$107 to $110
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, New York, cents per oz.	71.11
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	20.37	....	20.37
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c.

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ⅛ in., 28½c. per lb.; ⅛ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 24½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths, 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 99 lb., 58c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.00
Automobile radiators	7.25
Zincy bronze borings	7.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.00
Brass pipe	7.25
Old rolled brass	6.75
Admiralty condenser tubes	7.25
Muntz metal condenser tubes	6.75
Plated brass sheet, pipe reflectors	6.25
Manganese bronze solids	7.00[1]
Manganese bronze solids	6.00[2]
Manganese bronze borings	6.25[1]

OPA Group 4†

Refinery brass	4.50*

*Price varies with analysis, [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum*

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S 25S	4.00
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S solids	7.25
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	3.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 23¢ per lb.; 90 to 98% Ni, 23¢ per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb. lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25½
Electrodeposited	18¾
Rolled, oval, straight	19½
Curved	20¾
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23¾
Zinc, cast, 99.99, 15 in. or longer	16¼
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver Cyanide, 100 oz. lots, per oz.	0.6033
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 99 per cent, crystals, bbls., frt. allowed	6.35

SCRAP

Scrap Industry Eyes Labor Disputes

New York

• • • In general, it appears that the coming winter will be a critical period as regards the scrap situation, with reconversion (or reconfusion as some call it) due for a definite setback. Consumers throughout the country and Canada report low stockpiles on hand, with no relief in sight. Winter conditions have already affected some localities, and to add to this decline, one of the largest producers of scrap, the automobile industry, may not be in any position to contribute. In several sectors, the entire movement of scrap is held to be very ably handled by truck shipment only. Birmingham reports an impending shutdown of electric furnaces making alloy products, due to the scrap shortage.

Prices are holding firm at ceiling—in fact, as reported in some phenomenal buying in Philadelphia and Pittsburgh, the market is stronger than it has been for some months past.

Cleveland seems to be an exception to the general rule, in that the major consumers are said to be in a comfortable situation of scrap stockpiles.

The uncertain outcome of the steel industry labor dispute is making itself felt in some localities, where a "calm before the storm" attitude prevails.

•

PITTSBURGH — Scrap demand here continues very strong, but a note of caution has been observed in the market mainly because of the possible outcome of the steel strike election vote yesterday. Turnings are practically non-existent, with observers pointing out that the quantity now being received could be trucked into the district. Government surpluses are moving into the district from other points, mainly Maritime and Navy scrap, but Army scrap from this district is very slow in putting in any quantity appearance. Shipyards have been very active in disposing of scrap. Evidence of the strength of the market here was a sale of 10,000 tons of unprepared No. 2 auto scrap at Frederick, Md., last Friday, at ceiling, $13.03. Unprepared from Frederick has not been bringing full ceiling prices for nearly six months, but the sale last week went the full ceiling for the entire amount.

•

CHICAGO—Bids on 13,000 tons of termination scrap, probably the largest single lot in this area, were submitted Monday (Nov. 26) on material at the A. O. Smith Corp., Milwaukee plant. Close bidding, with top prices on standard material, was expected. Buying activity in the Chicago area continues at ceiling on all openhearth grades, with tonnage limited by available supply. Prices on blast furnace grades, however, are nominal due to continued lack of mill orders. Some blast furnace material is bringing ceiling offers from brokers for out-of-district shipment. Recent railroad offerings brought ceiling prices on some specialty items which had previously been sluggish, but demand appears limited for steel axles, cut tires and bolsters.

•

PHILADELPHIA—Scrap demand continues strong with all mills in this district accepting shipments. Particular concern of scrap men has been the direct purchase of unprepared scrap by a district consumer. In recent Navy Yard sales here, this consumer has been high bidder, paying $14.01 in two separate instances for scrap contaminated with glass, cable and nonferrous materials and $10.05 for a third acquisition. The second highest corresponding bids were $8.33 and $7.65. The complaint is that dealers cannot afford to pay such prices and are thereby being bypassed.

•

DETROIT—The supply of scrap from this district has diminished importantly as the result of the General Motors strike. Several G. M. divisions were just beginning to swing into quantity output when the tieup began last week, notably several of the basic Fisher plants, Pontiac and Buick. Probably the corporation as a whole was turning out somewhere around 500 tons of scrap or more daily, quite a bit of it in loose clips and No. 1 bundles. (Pontiac only recently put a new baler into operation) and the rest in turnings. No lists are expected from General Motors for December, and offerings of other companies are not expected to fill in much of the gap caused by this notable absence.

•

BOSTON—Because production is down and yard labor is lacking, there is no snap to the movement of material to steel mills. Were it not for truckload lots moving to foundries, some yards would be virtually at a standstill. Cast supplies are still inadequate, but movement of low phosphate plate to foundries is comparatively heavy. With below freezing temperatures hitting this area, yards report labor drifting to other work.

•

NEW YORK—The scrap situation remains unchanged this week. Demand is very strong, especially openhearth and blast furnace, and supplies are scarce, and some sources indicate that the automobile labor strike will cause a further cut in scrap production. A slight betterment of the labor problem is reported, aided by hiring of returning servicemen. Anticipated scrapping of Navy vessels in the very near future is expected to provide a little relief. Prices continue firm at ceiling.

•

BUFFALO — Inquiries for openhearth grades point to the probability of new orders being placed in the local market by at least one of the big consumers within the next week. Nothing came of the off-ceiling bid reported put out by a steel foundry and all railroad lists are firm at maximum prices. Winter has taken a hand in the situation, with the first heavy snowfall slowing down yard production.

•

CLEVELAND—What may be a lull before the storm with a strike vote pending in the steel industry, has quieted the market here down to a whisper. With all major consumers in comfortable condition at the moment, all grades continue to bring ceiling prices and brokers and dealers are showing considerable interest in the 10,000 tons of landing mat scrap scheduled for sale at Norfolk, Va. Bids on not less than 2000 tons will be opened Nov. 29. At $13.50 this comes a little high for the average dealer. Dealers bidding on termination inventory scrap are finding the time lag in awarding a handicap. At the same time, many operators are reported holding back their turnings until the first of the year.

•

CINCINNATI — Strength continues to pervade the local iron and steel scrap market, with brokers moving virtually all offerings promptly. In fact, some of the dealers and brokers indicate that the lack of production scrap is retarding somewhat a greater flow of business, since dealers indicate a steady demand, although consumers are not prone to make new contracts, but are satisfied with taking against commitments.

•

BIRMINGHAM — Some of the electric furnaces producing alloy products in this scrap market are threatened with a shutdown unless they are able to obtain quick deliveries of turnings. This item has been scarce since termination of shell contracts and the scarcity has been aggravated by the closing of General Motors plants. Blast furnace grades also are exceedingly short.

•

TORONTO — Demand contiues to exceed supply in the Canadian scrap iron and steel markets. Dealers report steady decline in receipts and the majority have no stockpiles in their yards and are depending on day to day receipts to fill customer orders. War Assets Corp. is offering scrap at regular intervals, but tonnages involved are comparatively small, mostly being absorbed by steel mills. Industrial plant scrap has shown sharp decline in recent weeks and most war plants now have been cleaned out, while offerings from the rural districts also have dropped off and dealers do not look for much scrap from outside points until next spring.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bdld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	$13.00 to 13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	$22.75 to 23.25
Cut bolsters & side frames	20.25 to 20.75
Angles & splice bars	22.25*
Standard stl. car axles	$4.00 to 24.50
No. 3 steel wheels	23.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast	20.00*
No. 1 agricul. cast	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	$10.50 to 11.00
Shoveling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovelings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	$13.06 to 14.15*

Truck delivery to foundry

Machinery cast	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*
Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.32*
No. 1 cupola cast	20.00*
Charging box cast	19.00*
Hvy. breakable cast	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shoveling turn.	15.75*
Cast iron borings	$13.50 to 14.00
Mixed bor. & turn.	13.75*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	$17.50*
Bundled sheets	17.50*
Mach. shop turn.	$11.00 to 11.50
Locomotive tires, uncut	18.00
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	20.00 to 20.50
Steel car axles	21.00 to 21.50
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	$10.50 to 11.00
Shoveling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	18.00 to 18.50
Structural and plate	18.00 to 18.50
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop. turn.	15.00*
Short shovel. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33
Mach. shop turn.	10.33
Mixed bor. & turn.	10.33
Shoveling turn.	12.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shoveling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	23.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00
No. 2 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel.	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	$15.50 to $16.25
No. 1 hvy. melting	15.50 to 16.25
No. 2 hvy. melting	14.50 to 15.25
No. 2 bales	12.00 to 12.75
No. 3 bales	9.50 to 10.25
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$12.00 to $13.00
No. 2 hvy. melting	11.00 to 12.00
No. 2 bales	10.00 to 11.00
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	$10.00
No. 1 & No. 2 hvy. melting	10.00
Elec. furn. 1 ft. und.	$14.00 to 15.00
No. 1 cupola cast	20.00*

HAMILTON, ONT.

Per gross ton delivered to consumer

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

[Advances over past week in Heavy Type; declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.]

Flat-Rolled Steel: (cents per pound)	Nov. 27, 1945	Nov. 20, 1945	Oct. 23, 1945	Nov. 28, 1944
Hot-rolled sheets	2.20	2.20	2.20	2.10
Cold-rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot-rolled strip	2.10	2.10	2.10	2.10
Cold-rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tinplate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.25	2.25	2.25	2.15
Cold-finished bars	2.75	2.75	2.75	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (cents per pound)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55
Rails: (dollars per gross ton)				
Heavy rails	$43.00	$43.00	$43.00	$40.00
Light rails	45.00	45.00	45.00	40.00
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$36.00	$36.00	$36.00	$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (per gross ton)	Nov. 27, 1945	Nov. 20, 1945	Oct. 23, 1945	Nov. 28, 1944
No. 2 foundry, Phila.	$27.59	$27.59	$27.59	$25.84
No. 2, Valley furnace	25.75	25.75	25.75	24.00
No. 2, Southern, Cin'ti	26.19	26.19	26.19	24.44
No. 2, Birmingham	22.13	22.13	22.13	20.38
No. 2 foundry, Chicago†	25.75	25.75	25.75	24.00
Basic, del'd eastern Pa.	27.09	27.09	27.09	25.34
Basic, Valley furnace	25.25	25.25	25.25	23.50
Malleable, Chicago†	25.75	25.75	25.75	24.00
Malleable, Valley	25.75	25.75	25.75	24.00
L. S. charcoal, Chicago	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 50¢ per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$18.25
Heavy melt'g steel, Phila.	18.75	18.75	18.75	15.50
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	17.50
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	12.75
Low phos. plate, Youngs'n	22.50	22.50	22.50	19.75
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$7.50	$7.50	$7.50	$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Composite Prices . .

[Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943 issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 58 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.]

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Nov. 27, 1945	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One week ago	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One month ago	2.44076¢ per lb.	$25.37 per gross ton	$19.17 per gross ton
One year ago	2.21189¢ per lb.	$23.61 per gross ton	$17.08 per gross ton

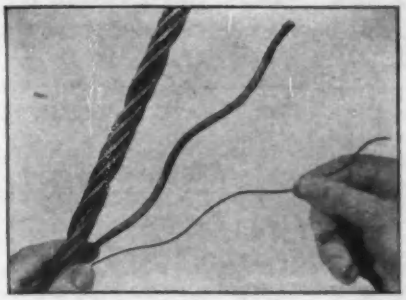
	HIGH			LOW			HIGH	LOW	HIGH	LOW
1945	2.44076¢	Oct.	2	2.38444¢	Jan.	2	$25.37 Oct. 23	$23.61 Jan. 2	$19.17	$19.17
1944	2.30837¢	Sept.	5	2.21189¢	Oct.	5	$23.61	$23.61	19.17	$15.67 Oct. 24
1943	2.25513¢			2.25513¢			23.61	23.61	19.17	$19.17
1942	2.26190¢			2.26190¢			23.61	23.61	19.17	19.17
1941	2.43078¢			2.43078¢			$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢	Jan.	2	2.24107¢	Apr.	16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢	Jan.	3	2.26689¢	May	16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢	Jan.	4	2.27207¢	Oct.	18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢	Mar.	9	2.32263¢	Jan.	4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 8
1936	2.32263¢	Dec.	28	2.05200¢	Mar.	10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 9
1935	2.07642¢	Oct.	1	2.06492¢	Jan.	8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢	Apr.	24	1.95757¢	Jan.	2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢	Oct.	3	1.75836¢	May	2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢	July	5	1.83901¢	Mar.	1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢	Jan.	13	1.86586¢	Dec.	29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢	Jan.	7	1.97319¢	Dec.	9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢	May	28	2.26498¢	Oct.	29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941 issue.

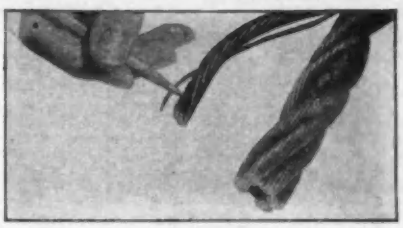
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

For maximum safety, service, economy



All wires and strands in Macwhyte PREformed are spiral shaped to fit naturally into position. When you select Macwhyte PREformed you get "the correct rope for your equipment," plus a personal interest in helping you get the most out of your rope.



All Macwhyte PREformed is internally lubricated! Macwhyte Wire Rope Lubricant is packed around each wire in all strands. This improves the sliding action of the wires as they move in bending around sheaves and drums. It also protects against inside corrosion.

You make sure of the best when you buy Macwhyte PREformed. It's a rope with less internal fatigue, less friction, better balance and longer life. It's a safer, easier-to-use rope. These extra advantages are acquired through PREforming — every strand is shaped to take its place *naturally* in the rope. Internal stresses are held to a minimum.

The wire that goes into Macwhyte PREformed is processed under constant metallurgical control in Macwhyte's own wire mill. And when this tough, flexible wire is assembled into strands, PREformed and internally lubricated under close supervision of Macwhyte wire rope craftsmen, it just has to be the correct rope for your equipment.

Macwhyte PREformed is especially recommended for your extra-tough jobs, though many wire rope users tell us it pays them to specify this superior rope for all operations. They say its greater life makes it cost less in the long run.

Get this Macwhyte Wire Rope Catalog!

170 pages of useful information. A request on your company letterhead will bring it to you promptly. Ask for Catalog G-15.

MACWHYTE COMPANY

Wire Rope Manufacturers

2911 Fourteenth Avenue, Kenosha, Wisconsin

Mill Depots: New York • Pittsburgh • Chicago • Fort Worth • Portland • Seattle
San Francisco • Distributors throughout the U. S. A.

MACWHYTE PREformed and Internally Lubricated Wire Rope . . . MONARCH WHYTE STRAND Wire Rope . . . MACWHYTE Special Traction Elevator Rope . . . MACWHYTE Braided Wire Rope Slings . . . MACWHYTE Aircraft Cables and Tie-Rods . . . MACWHYTE Stainless Steel Wire Rope, Monel Metal Wire Rope, Galvanized Wire Rope

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb. to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15c. per lb higher.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars [10]	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($31.00 f.o.b. mill)														
Carbon, forging	$36	$36	$36	$36	$36	$36	$36								
Alloy	$45	$45				$45	(Bethlehem, Massillon, Canton, Coatesville—$45)								
BILLETS, BLOOMS, SLABS							(Provo—$47.20, Duluth—$38[14])								
Carbon, rerolling	$36	$36	$36	$36	$36	$36	$36	$36				$48[14]	$38		
							(Provo—$53.20, Duluth—$44[14])								
Carbon, forging	$42	$42	$42	$42	$42	$42	$42					$54[14]	$44		
Alloy	$54	$54				$54	(Bethlehem, Massillon, Canton—$54)						$56		
SHEET BARS	$36	$36		$36		$36	$36	$36	(Canton—$36)						
PIPE SKELP	1.90¢	1.90¢					1.90¢	1.90¢	(Coatesville—1.90¢)						
WIRE RODS [15]															
No. 5 to 9/32 in.	2.15¢	2.15¢		2.15¢	2.15¢	(Worcester—2.25¢)					2.40¢	2.65¢			
SHEETS															
Hot-rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold-rolled [1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long terne [2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot-rolled [3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold-rolled [4]	2.90¢	2.90¢		2.80¢			2.80¢	(Worcester—3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity cold-rolled	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester—3.35¢)					3.05¢	3.31¢	
TINPLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10					$5.38	$5.32
Electro, box 0.25 lb	$4.35	$4.35	$4.35						$4.60						
Electro, box 0.50 lb	$4.50	$4.50	$4.50						$4.75						
Electro, box 0.75 lb	$4.65		$4.65												
BLACKPLATE															
29 gage [5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[11]			3.37¢
TERNES, MFG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS								(Duluth—2.35¢,							
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25	Provo, Utah 2.95¢)			2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel [6]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) [7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold-finished [8]	2.75¢	2.75¢	2.75¢	2.75¢		2.75¢		(Detroit—2.80¢)			(Toledo—2.90¢)			3.09¢	3.07¢
Alloy, hot-rolled	2.70¢	2.70¢				2.70¢	2.70	(Bethlehem, Massillon, Canton—2.70¢)					2.80¢		
Alloy, cold-drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont—2.25¢, Provo, Utah 2.95¢)							
Carbon steel [13]	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢	2.25¢			2.60¢	2.80¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.86¢	3.82¢
Alloy	3.50¢	3.50¢			(Coatesville—3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem—2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢			(Worcester—3.00¢)								
0.51 to 0.75 carbon	4.30¢			4.30¢			(Worcester—4.50¢)								
0.76 to 1.00 carbon	6.15¢			6.15¢			(Worcester—6.35¢)								
1.01 to 1.25 carbon	8.35¢			8.35¢			(Worcester—8.55¢)								
WIRE [9]															
Bright [12]	2.75¢	2.75¢		2.75¢	2.75¢		(Worcester—2.85¢)			(Duluth—2.80¢)		3.25¢			3.07¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire base														
Spring (high carbon)	3.35¢	3.35¢		3.35¢			(Worcester—3.45¢)					3.85¢			3.67¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila	Subject to negotiation		Subject to negotiation			
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt	21.25	20.40	15.725	16.15	19.125	23.375
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	21.25	20.40	15.725	16.15	19.125	23.375
Billets, P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt	Subject to negotiation		Subject to negotiation			
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	21.25	20.40	15.725	16.15	19.125	23.375
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	25.00	24.00	18.50	19.00	22.50	27.50
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	25.00	24.00	18.50	19.00	22.50	27.50
Plates, P'gh, Middletown, Canton	29.00	27.00	21.50	22.00	26.50	30.50
Shapes, structural, P'gh, Chi	25.00	24.00	18.50	19.00	22.50	27.50
Sheets, P'gh, Chi, Middletown, Canton, Balt	36.00	34.00	26.50	29.00	32.50	36.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	23.50	21.50	17.00	17.50	24.00	35.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	30.00	28.00	22.00	22.50	32.00	42.00
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila	25.00	24.00	18.50	19.00	22.50	27.50
Wire flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	30.00	28.00	22.00	22.50	32.00	42.00
Rod, h-r, Newark, N. J. Syracuse	25.00	24.00	18.50	19.00	22.50	27.50
Tubing, seamless, P'gh Chi, Canton, (4 in. to 6 in.)	66.63	66.63	.....	63.30	.....	.....

SHELL STEEL

	per gross ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; East Michigan, $3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	per lb.
Field grade	3.30¢
Armature	3.65¢
Electrical	4.15¢
Motor	5.05¢
Dynamo	5.75¢
Transformer 72	6.25¢
Transformer 65	7.25¢
Transformer 58	7.75¢
Transformer 52	8.55¢

F.o.b. Granite City, add 10¢ per 100 lb. on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb. on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb
No. 1 O.H., gross ton $43.00
Angle splice bars, 100 lb..... 2.70

(F.o.b. Basing Points)	per gross ton
Light rails (from billets)	$45.00
Light rails (from rail steel)	44.00

	base per lb.
Cut spikes	3.25¢
Screw spikes	5.40¢
Tie plate, steel	2.30¢
Tie plates, Pacific Coast	2.45¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk)

(*Also Canton, O.)	base per lb.
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices east of Mississippi are 2¢ per lb. higher; west of Mississippi 3¢ higher.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct. f.o.b. Pittsburgh, Washington, Pa.	18.00*	19.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.00	....
Inconel-clad		
10 pct, f.o.b. Coatesville	25.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	base per keg	
Standard wire nails	$2.90	$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	....
	base per 100 lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	base column	
Woven wire fence*	67	85
Fence posts, carloads	69	86
Single loop bale ties	66	91
Galvanized barbed wire**	72	82
Twisted barbless wire	72	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms, and Slabs	Bars and Bar-strip	Billets, Blooms, and Slabs
NE 8600	0.65¢	$13.00	$1.15	$23.00
NE 8700	0.70	14.00	1.20	24.00
NE 9400	0.75	15.00	1.25	25.00
NE 9700	0.65	13.00	1.15	23.00
NE 9800	1.30	26.00	1.80	36.00
NE 9900	1.20	24.00	1.55	31.00

The extras shown are in addition to the base price of $2.70 per 100 lb on finished products and $54 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.25¢ per lb for bars and bar-strip and $5 per gross ton for billets, blooms and slabs.

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe) base price—$200.00 per net ton

Steel (buttweld)

	Black	Galv.
⅛-in.	63½	51
¼-in.	66½	55
⅜-in. to 3-in.	68½	57½

Wrought Iron (buttweld)

⅛-in.	24	3½
¼-in.	30	10
⅜-in. and 1¼-in.	34	16
1½-in.	35	18½
2-in.	37½	18

Steel (lapweld)

2-in.	61	49½
2½-in. and 3-in.	64	52½
3½-in. to 6-in.	66	54½

Wrought Iron (lapweld)

2-in.	30½	12
2½-in. to 3½-in.	31½	14½
4-in.	33½	18
4½-in. to 8-in.	32½	17

Steel (butt, extra strong, plain ends)

⅛-in.	61½	50½
¼-in.	65½	54½
⅜-in. to 3-in.	67	57

Wrought Iron (same as above)

⅛-in.	25	6
¼-in.	31	12
⅜-in. to 2-in.	35	19½

Steel (lap, extra strong, plain ends)

2-in.	59	48½
2½-in. and 3-in.	63	52½
3½-in. to 6-in.	66½	56

Wrought Iron (same as above)

2-in.	33½	15½
2½-in. to 4-in.	39	22½
4½-in. to 6-in.	37½	21

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or $2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots.

	Seamless Cold-Drawn	Seamless Hot-Rolled	Lapweld, Hot-Rolled
2 in. O.D. 13 B.W.G.	15.03	13.04	12.38
2½ in. O.D. 12 B.W.G.	20.21	17.54	16.58
3 in. O.D. 12 B.W.G.	22.48	19.50	18.35
3½ in. O.D. 11 B.W.G.	28.37	24.62	23.15
4 in. O.D. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft or 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle.	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect 3 pct tax on freight rates.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

	Percent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1¼ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. through 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 pct additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages	71
In bulk	80

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Percent Off List*
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF, Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.

Copper, electrolytic, 150 and 200 mesh	21½¢ to 23¼¢
Copper, reduced, 150 and 200 mesh	20½¢ to 25½¢
Iron, commercial, 100 and 200 mesh 96 + % Fe	12½¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	$1.40
Chromium, 100 mesh and finer	$1.25
Lead, 100, 200 & 300 mesh	11½ to 15¢
Manganese	65¢
Nickel, 150 mesh	51½¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	58¾¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb	$2.60
Under 100 lb	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, del'd	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.25
St. Louis, del'd	14.25
Birmingham, del'd	10.90

*Hand drawn ovens using trucked coal permitted to charge $8.60 per ton plus transportation charges.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$68.50
First quality, Pa., Md., Ky., Mo., Ill.	54.40
First quality, New Jersey	59.35
Sec. quality, Pa., Md., Ky., Mo., Ill.	49.35
Sec. quality, New Jersey	51.95
No. 1 Ohio	45.60
Ground fire clay, net ton	8.05

Silica Brick

Pennsylvania and Birmingham	$54.40
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55

Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. in bulk	22.00
in sacks	26.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 9617-30	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 9617-30	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	$3.518	$4.872[1]	$4.768[2]	$3.922	$4.772	$3.605	$3.668	$3.822	$4.172	$6.818	$6.868	$7.072	$8.172
New York	3.59	4.613[3]	5.110	3.974[6]	4.772	3.768	3.758	3.853	4.203	6.958	6.908	7.108	8.203
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.552	4.894	3.902	4.752	3.584	3.759	3.802	4.152	....	....	....	....
Norfolk	3.771	4.986	5.371	4.165	4.965	3.971	4.002	4.065	4.265	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.95	6.60	6.65	6.65	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.987	6.837	6.887	6.887	7.987
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.85	6.806	6.856	6.85	7.75
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.85	6.60	6.65	6.65	7.75
Detroit	3.45	4.50	5.004	3.70	4.858[17]	3.609	3.661	3.45	3.90	6.93	6.98	6.959	8.059
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.661	3.661	3.611	4.111	6.98	7.00	7.011	8.261
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.131	6.981	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.85	6.60	6.65	6.65	7.90
St. Paul	3.50	4.46	5.257[4]	3.86	5.102[17]	3.813[3]	3.813[3]	3.763[3]	3.461	6.94	6.99	7.361	8.461
Omaha	3.865	5.443	5.609[4]	4.215	....	4.165	4.165	4.115	4.543	....	....	....	....
Indianapolis	3.518	4.568	4.918	3.768	4.741	3.63	3.63	3.58	4.00	6.93	6.98	6.99	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.53	....	....	....	....
Memphis	3.965[7]	4.66	5.268	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	5.078	5.358	4.308	....	4.158	4.158*	4.108*	4.729	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.26	4.26	3.76	6.473[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[9]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.883	8.204	9.404	9.304	10.484
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.33[17]	4.65[14]	4.35[14]	4.15[14]	5.433	8.304	9.404	9.404	10.484
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.883	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.85[11]	4.45[11]	4.45[11]	5.633	8.304	9.404	8.304	9.404
Salt Lake City	4.53[017]	....	6.17[13]	5.53[17]	....	4.93[17]	4.93[17]	4.88[17]	6.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 2749 lb. (10) 400 to 2999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

(*) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271¢ for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Maximum per gross ton, established by OPA Oct. 22, 1945. Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	$26.25	$26.75	$27.25	$27.75	.....
Birdsboro	26.25	26.75	27.25	27.75	$31.25
Birmingham	20.75	22.13	.....	26.75	.....
Buffalo	24.75	25.75	26.25	26.75	31.25
Chicago	25.25	25.75	25.75	26.25	.....
Cleveland	25.25	25.75	25.75	26.25	.....
Detroit	25.25	25.75	25.75	26.25	.....
Duluth	25.75	26.25	26.25	26.75	.....
Erie	25.25	25.75	26.25	26.75	.....
Everett	26.25	26.75	27.25	27.75	.....
Granite City	25.25	25.75	25.75	26.25	.....
Hamilton	25.25	25.75	25.75	.....	.....
Neville Island	25.25	25.75	25.75	26.25	.....
Provo	23.25	23.75	.....	.....	.....
Sharpsville [1]	25.25	25.75	25.75	26.25	.....
Sparrows Point	26.25	26.75	.....	.....	31.25
Steelton	26.25	.....	.....	.....	.....
Swedeland	26.25	26.75	27.25	27.75	.....
Toledo	25.25	25.75	25.75	26.25	.....
Youngstown	25.25	25.75	25.75	26.25	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$ .50	$26.75	$27.25	$27.75	$28.25	.....
Boston	Birdsboro-Steelton	4.02	.....	.....	.....	.....	$35.27
Brooklyn	Bethlehem	2.50	28.75	29.25	29.75	30.25	.....
Brooklyn	Birdsboro	2.02	.....	.....	.....	.....	34.17
Canton	Cleveland	1.39	26.64	27.14	27.14	27.64	.....
Canton	Buffalo	3.19	.....	.....	.....	.....	34.44
Cincinnati	Birmingham	4.08	24.81	26.19	.....	.....	.....
Cincinnati	Hamilton	1.11	.....	.....	26.86	.....	.....
Cincinnati	Buffalo	4.40	.....	.....	.....	.....	35.65
Jersey City	Bethlehem	1.53	27.78	28.28	28.78	29.28	.....
Jersey City	Birdsboro	1.04	.....	.....	.....	.....	33.19
Los Angeles	Provo	4.95	28.20	28.70	.....	.....	.....
Los Angeles	Buffalo	15.41	.....	.....	.....	.....	46.66
Mansfield	Cleveland & Toledo	1.94	27.19	27.69	27.69	28.19	.....
Mansfield	Buffalo	3.38	.....	.....	.....	.....	34.63
Philadelphia	Swedeland	.84	27.09	27.59	28.09	28.59	.....
Philadelphia	Birdsboro	1.24	.....	.....	.....	.....	32.49
San Francisco	Provo	4.95	28.20	28.70	.....	.....	.....
San Francisco	Buffalo	15.41	.....	.....	.....	.....	46.66
Seattle	Provo	4.95	28.20	28.70	.....	.....	.....
Seattle	Buffalo	15.41	.....	.....	.....	.....	46.66
St. Louis	Granite City	.50	25.75	26.25	26.25	26.75	.....
St. Louis	Buffalo	7.07	.....	.....	.....	.....	38.32

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, $33.00 and $34.00, respectively. Newberry Brand of Lake Superior charcoal iron $39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, $42.34. High phosphorus iron sells at Lyles, Tenn., at $28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50¢ a ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); Phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; Manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$31.25; f.o.b. Buffalo—$32.50. Add $1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for prices of comparable analysis.

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Ferromanganese Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66% contained Mn. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	6.05¢	6.30¢	6.60¢
Ton lots	6.65¢	7.55¢	8.55¢
Less ton lots	6.80¢	7.80¢	8.80¢

Manganese Metal

Contract basis, lump size, per pound of metal, f.o.b. shipping point with freight allowed. Spot sales add 2¢ per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30¢
L.c.l. lots	32¢

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	34¢
Ton lots	36¢
Less ton lots	38¢

Spiegeleisen

Maximum base contract prices per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Low-Carbon Ferromanganese

Contract prices per pound of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, eastern zone. Add 0.25¢ for spot sales.

	Carloads, Bulk	Ton Lots	Less Ton
0.06% C, 0.06% P, 90% Mn	23.00¢	23.40¢	23.65¢
0.10% max. C, 1% or 2% max. Si	23.00¢	23.40¢	23.65¢
0.15% max. C, 1% or 2% max. Si	22.00¢	22.40¢	22.65¢
0.30% max. C, 1% or 2% max. Si	21.00¢	21.40¢	21.65¢
0.50% max. C, 1% or 2% max. Si	20.00¢	20.40¢	20.65¢
0.75% max. C, 7.00% max. Si	16.00¢	16.40¢	16.65¢

Electric Ferrosilicon

OPA maximum base price cents per pound contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern	Central	Western
50% Si	6.65¢	7.10¢	7.35¢
75% Si	8.05¢	8.20¢	8.75¢
80-90% Si	8.90¢	9.05¢	9.55¢
90-95% Si	11.05¢	11.20¢	11.65¢

Silvery Iron

Si 14.01 to 14.50%, $45.50 per G. T. f.o.b. Jackson, Ohio. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per pound of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb, packed. Add 0.25¢ for spot sales.

	Eastern	Central	Western
96% Si, 2% Fe	13.10¢	13.55¢	16.50¢
97% Si, 1% Fe	13.45¢	13.90¢	16.80¢

Ferrosilicon Briquets

OPA maximum base price per pound of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add 25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	3.35¢	3.50¢	3.65¢
2000 lb-carload	3.80¢	4.20¢	4.25¢

Silicomanganese

Contract basis lump size, per pound of metal, f.o.b. shipping point with freight allowed. Add 25¢ for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05¢
2000 lb to carload	6.70¢
Briquet, contract basis, carlots, bulk freight allowed, per lb	5.80¢
2000 lb to carload	6.30¢
Less ton lots	6.55¢

Ferrochrome

(65-72% *Cr*, 2% *max. Si*)

OPA maximum base contract prices per pound of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add 0.25¢ per lb contained Cr for spot sales.

	Eastern	Central	Western
0.06% C	23.00¢	23.40¢	24.00¢
0.10% C	22.50¢	22.90¢	23.50¢
0.15% C	22.00¢	22.40¢	23.00¢
0.20% C	21.50¢	21.90¢	22.50¢
0.50% C	21.00¢	21.40¢	22.00¢
1.00% C	20.50¢	20.90¢	21.50¢
2.00% C	19.50¢	19.90¢	21.00¢
66-71% Cr, 4-10% C	13.00¢	13.40¢	14.00¢
62-66% Cr, 5-7% C	13.50¢	13.90¢	14.50¢

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

Ferrochrome Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60% contained chromium. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk	8.25¢	8.55¢	8.95¢
Ton lots	8.75¢	9.25¢	10.75¢
Less ton lots	9.00¢	9.50¢	11.00¢

Calcium—Manganese—Silicon

Contract prices per pound of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carloads	15.50¢	16.00¢	18.05¢
Ton lots	16.50¢	17.35¢	19.10¢
Less ton lots	17.00¢	17.35¢	19.60¢

Calcium Metal

Eastern zone contract prices per pound of metal, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. Add 0.9¢ for central zone; 0.49¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.80	$2.30	$5.00
Less ton lots	2.30	2.80	5.75

Chromium—Copper

Contract price per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2¢ for spot sales.

Shot or ingot	45¢

Ferroboron

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Ton lots	$1.20	$1.2075	$1.229
Less ton lots	1.30	1.3075	1.329

Manganese—Boron

Contract prices per pound of alloy, f.o.b. shipping point, freight charges allowed. Add 5¢ for spot sales.

75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern	Central	Western
Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern	Central	Western
11,200 lb or more	$1.90	$1.9125	$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, standard grade lump or ¼X down, packed f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per pound contained tungsten, 10,000 lb or more	$1.90
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, usual freight allowances, per pound contained V.	
Openhearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producers plant, usual freight allowances, per pound of cobalt metal	$1.50
Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, any quantity, per pound contained V_2O_5. Spot sales add 5¢ per lb contained V_2O_5	$1.10
Silcaz No. 3, contract basis, f.o.b. plant with usual freight allowances, per pound of alloy.	
Carload lots	25¢
2000 lb to carload	26¢
Silvaz No. 3, contract basis, f.o.b. plant with freight allowances, per pound of alloy.	
Carload lots	58¢
2000 lb to carload	59¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb and over, max. based on rate to St. Louis	
No. 1	87.5¢
No. 6	60¢
No. 79	45¢
Bortram, f.o.b. Niagara Falls	
Ton lots, per lb	45¢
Less ton lots, per lb	50¢
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per pound contained Cb.	
2000-lb lots	$2.25
Under 2000-lb lots	$2.30
Ferrotitanium, 40-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.23
Less ton lots	$1.35
Ferrotitanium, 20-25%, 0.10%C. max., ton lots, per pound contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y. freight allowed east of Mississippi, north of Baltimore and St. Louis, per carload	$142.50
Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per pound contained Mo	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per pound contained Mo	80¢
Molybdenum oxide briquets, 48-52% Mo f.o.b. Langeloth, Pa., per pound contained Mo	80¢
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo	80¢
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per pound of alloy. Add ½¢ for spot sales	
Carload lots	14¢
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per pound of alloy	
Carload, bulk	4.60¢
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk	5.25¢
Ton lots	7.25¢
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per pound.	
Car lots	8.00¢
Ton lots	8.75¢
Less ton lots	9.25¢

ARE ENGINEERED FOR FAST, TROUBLE-FREE ASSEMBLY OF YOUR PRODUCTS...CAREFULLY MADE FOR APPEARANCE *and* EXACT FIT

Lamson & Sessions makes a large tonnage of machine screws and stove bolts every day, and all must stand critical inspection — starting with wire analysis, and all must measure up to a single high standard of quality. It is a rare thing indeed to find an imperfect Lamson machine screw or stove bolt in a customer's shipment. We know very well that small as they are, positive-driving, close-fitting machine screws are important to your product—important to its appearance, its serviceability, and important in assembly time saved.

In addition to conventional slotted head types, Lamson makes Phillips and Clutch head machine screws in all usual head styles including round, flat, truss (oven), pan, (binding), oval and fillister. Standard lock washers, either helical spring or tooth-types, as well as ordinary flat washers can be permanently applied before rolling the screw threads, providing the Lamson Lockwasher screw which eliminates separate washer inventories and saves time spent in applying washers by hand.

Ask for the new Lamson folder just off the press containing list prices, stock sizes and all essential specifications in convenient, easy-reference form.

THE LAMSON & SESSIONS COMPANY, General Offices: Cleveland 2, Ohio

Plants at Cleveland and Kent, Ohio; Chicago and Birmingham

"BOLTS, NUTS & SCREWS"—1944 REVISION. Cloth bound. Limited edition, 180 pages of technical, practical information. Sent prepaid for *$1.00—cash or check must accompany your order.*

"THE LAMSON BLUE BOOK"—is our standard Catalog of standard products excepting our Aircraft products. *Sent gratis.*

"SIMPLIFIED STOCK LIST"—Of bolts, nuts and screws, conforming to latest revisions of the Office of Price Administration, and of great value in showing you in what ratio quantities of various standard products are kept in stock for deliveries, by your jobbers and in our own (and other bolt manufacturers') warehouse stocks. *Sent gratis.*

HERE'S A COUPON FOR YOUR CONVENIENCE

THE LAMSON & SESSIONS COMPANY • 1971 West 85th Street • Cleveland 2, Ohio

Please send us ☐ Lamson Blue Book ☐ Bolts, Nuts and Screws ($1.00) ☐ Simplified Stock Sizes

Send information on ☐ Machine Screws ☐ Lamson Lock Nuts ☐ Lock-washer Screws ☐ Thrd. Forming Screws

Name _____ Title or Kind of Work

Company _____

Street Address _____

City, Zone and State _____

No. 1969—Copyright 1945—The Lamson & Sessions Co.

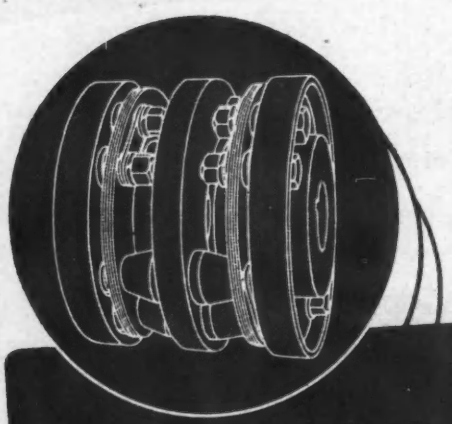
LAMSON & SESSIONS

BOLTS · · NUTS · · COTTERS · · CAP SCREWS · · SPECIALS

Your Jobber Stocks the Lamson Line

THOMAS
Flexible COUPLINGS

....are specified by engineers, wherever 100% Operating Efficiency is demanded



TYPE DBZ

TYPE DSM

TYPE CM

TYPE ST

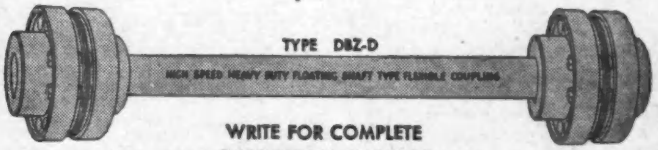
TYPE AM

TYPE SS

THOMAS *Flexible* COUPLINGS provide for Angular and Parallel Misalignment as well as Free End Float ... *and Eliminate* BACKLASH, FRICTION, WEAR and CROSS-PULL

NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.



TYPE DBZ-D

HIGH SPEED HEAVY DUTY FLOATING SHAFT TYPE FLEXIBLE COUPLING

WRITE FOR COMPLETE ENGINEERING CATALOG

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA

Construction Steel...

New York

• • • **Fabricated steel awards** this week included the following:

4500 Tons, St. Louis, generating plant Union Electric Power Co. of Illinois, to Mississippi Valley Structural Steel Co., Decatur, Ill., and Strupp Brothers Bridge & Iron Co., jointly, through Stone & Webster Engineering Co., Boston.

4260 Tons, New York, hopper barges, City of New York, to Bethlehem Steel Co., Bethlehem, Pa.

2762 Tons, Uruguay, South America, transmission towers, U. S. Steel Export Co., to American Bridge Co., Pittsburgh.

2552 Tons, New York, Coca-Cola Bottling Co., to American Bridge Co., Pittsburgh.

2000 Tons, Rockford, Ill., generating plant, Central Illinois Electric & Gas Co., to American Bridge Co., Pittsburgh, through A. C. Woods Co., Rockford, contractor and Stone & Webster Engineering Co., Boston.

1420 Tons, Celco, Va., spinning building, Celanese Corp., to Bethlehem Steel Co., Bethlehem, Pa.

1383 Tons, Far East, warehouse and utilities buildings, U. S. Steel Export Co., to American Bridge Co., Pittsburgh.

1080 Tons, New York, apartment house, to Bethlehem Fabricators, Bethlehem, Pa.

1075 Tons, Greensboro, N. C., mail order building, Sears Roebuck Co., to Bethlehem Steel Co., Bethlehem, Pa.

1000 Tons, Meadowland, Pa., manufacturing plant, to Fort Pitt Bridge Works, Pittsburgh.

950 Tons, Milwaukee, Froedtert Grain & Malting Co., kiln and germinating building, to Milwaukee Bridge Co., Milwaukee.

750 Tons, Kalamazoo, Mich., Upjohn Co. building, to American Bridge Co., Pittsburgh, through the Austin Co., Cleveland, contractor.

627 Tons, Hamilton, Ohio, manufacturing building, to Bedford Foundry & Machine Co.

623 Tons, Wheeling, W. Va., factory building, to Engstrom & Wynn, to American Bridge Co., Pittsburgh.

603 Tons, New York, apartment house, to Bethlehem Steel Co., Bethlehem, Pa.

480 Tons, Trenton, N. J., new building, L. A. Young Spring & Wire Co., to N. A. K. Bugbee Co., Bethlehem Fabricators, Bethlehem, Pa., suppliers.

460 Tons, Lyndhurst, N. J., factory building, to Belmont Iron Works, Philadelphia.

422 Tons, Pittsburgh, sand barges, to Treadwell Construction Co., Midland, Pa.

417 Tons, Trenton, N. J., factory and office building, to Belmont Iron Works, Philadelphia.

400 Tons, Detroit, alterations, for Briggs Outer Drive plant, to Whitehead & Kales Co., Detroit, through W. E. Wood Co., Detroit.

400 Tons, Houston, Tex., new Ford parts building, to Mosher Steel Co., Houston.

400 Tons, Glassboro, N. J., extensions and alterations, Owens-Illinois Glass Co., to Phoenix Iron Co., Phoenixville, Pa.

386 Tons, Norfolk, Va., building for Coca-Cola Co., through Virginia Engineering Co., to Virginia Bridge Co., Roanoke, Va.

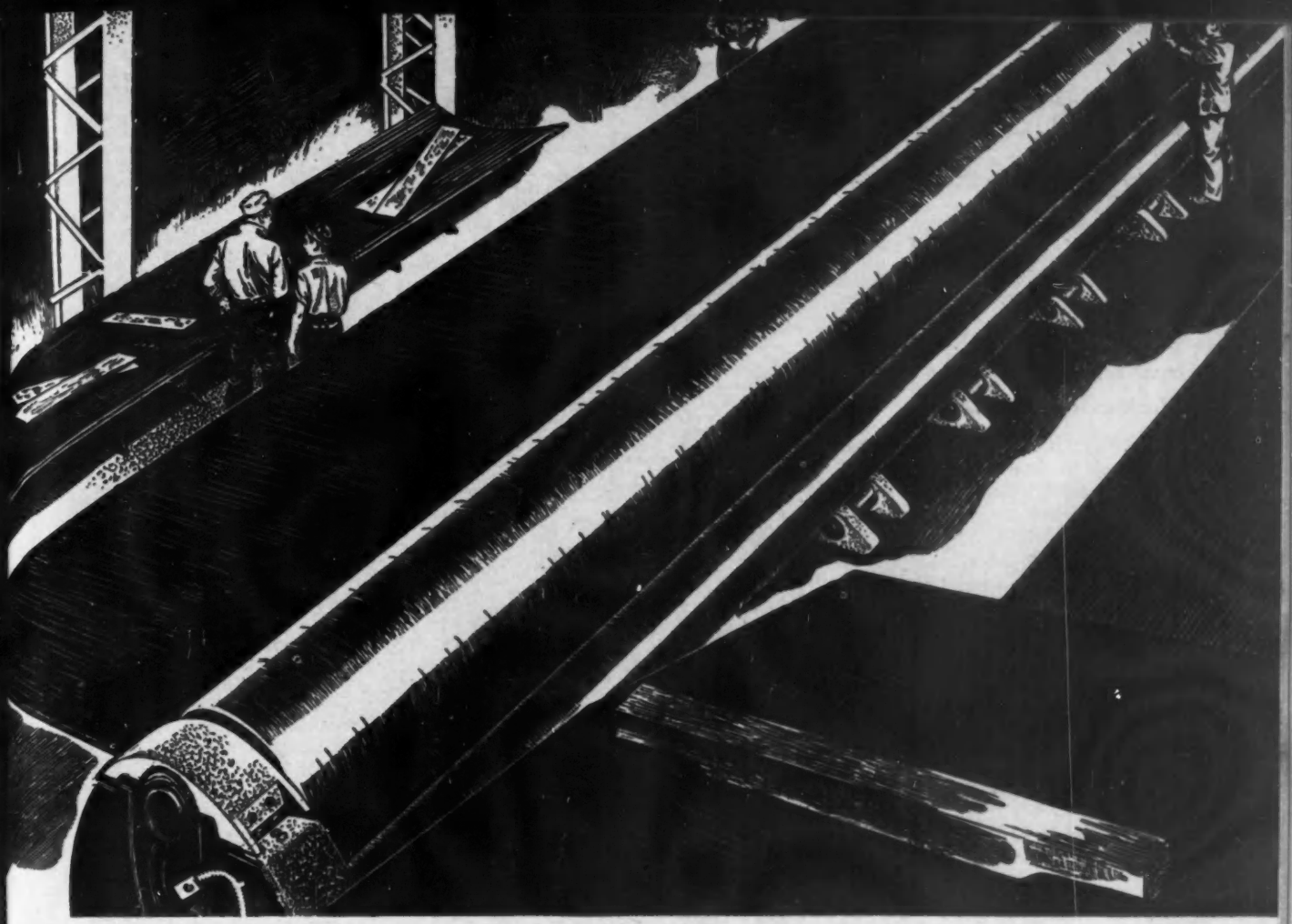
383 Tons, Venezuela, South America, hangar, U. S. Steel Export Co., to American Bridge Co., Pittsburgh.

300 Tons, Midland, Mich., new plastics warehouse for Dow Chemical Co., to Flint Structural Steel Co., through Austin Co., Detroit.

300 Tons, Inglis, Fla., powerhouse extension for Florida Power Co., to Ingalls Iron Works Co., Birmingham.

225 Tons, Philadelphia, alterations and additions, Edgcomb Steel Co., to Bethlehem Steel Co., Bethlehem, Pa.

213 Tons, Garland City, Ark., bridge, St.



Hatching a HEAVYWEIGHT

...Huge Plate Roll Fabricated By Thermit Welding

You're looking at a large bending roll that functions above two smaller bottom rolls as a unit for forming steel plate. Fabricating this heavyweight roll threatened for a time to be a major difficulty. Few foundries were available that could make a single casting of the required size: 38 feet long by 31½ inches in diameter and 50 tons in weight. The problem was solved by making two castings of about 25 tons each and uniting them by Thermit welding.

It's Thermit welding's ready adaptability for such heavy tonnage jobs that makes it so suitable a process for both fabrication and repair of large castings and forgings.

Thermit welding joins smaller parts into large units to save time, money, shipping and handling problems. There's no limit to the size of a Thermit weld—no need for stress-relieving—no need to worry about the strength or permanence of the weld, for it's as strong as a forging of the same cross-section.

Thermit welding can be done in your own plant, by your own crew, under M & T supervision, or at the following Metal & Thermit Corporation Branches: Jersey City, New Jersey; Chicago, Illinois; Pittsburgh, Pennsylvania; or South San Francisco, California.

Thermit Welding

Work Starts on Brazilian Steel Plant Foundry

Dual purpose facility to cost $1,850,000 and will be one of most unusual foundries in the Western Hemisphere

CONSTRUCTION of a foundry—one of the most unusual in the Western Hemisphere—for the large Brazilian National Steel project at Volta Redonda, Brazil, has been started.

The foundry, according to Roy I. Jones, head of the Industrial Engineering Division of Giffels & Vallet Inc., L. Rossetti, associated engineers and architects, Detroit, who designed the complete foundry project, will produce ingot molds and stools, iron grain and chilled rolls, steel rolls, miscellaneous iron, steel and nonferrous castings. The foundry which will cost approximately $1,850,000 will pioneer in many ways the reduction of hand labor and the improving of working conditions in the Brazilian foundry industry.

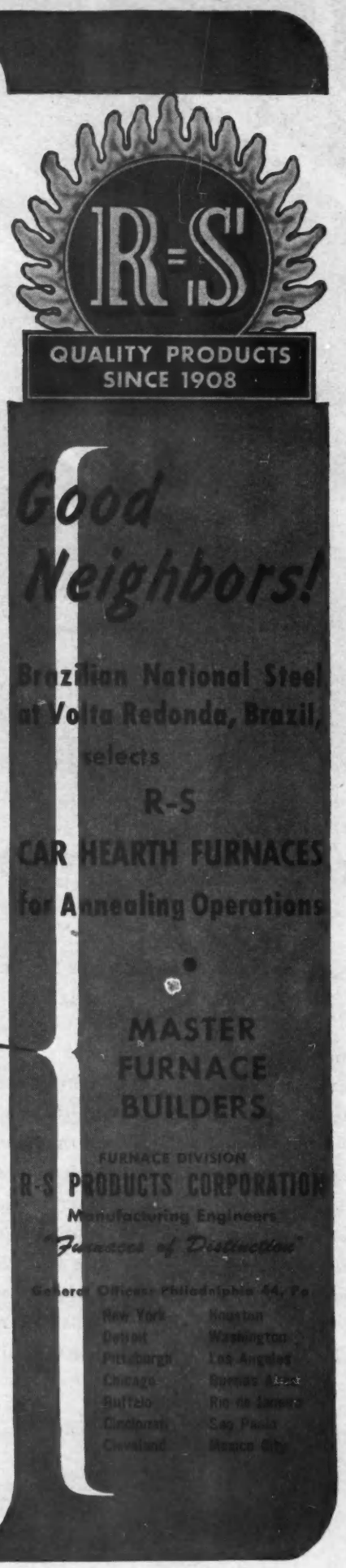
The foundry is a dual purpose facility. Half of the space is devoted to highly mechanized production systems for the regular supply of ingot molds and stools. The remaining half of the foundry is primarily for production of castings to keep the mill equipment in constant operation, and has facilities and equipment capable of producing any casting in the entire steel mill.

The foundry is designed so that ingot molds may be poured with hot blast furnace metal direct from the open-hearth mixers. Its equipment includes a cupola, air furnace, electric furnace, monophase furnace, nonferrous metal furnace, annealing furnaces, pit type ingot mold ovens, a completely mechanized sand conditioning and distribution system, casting and cleaning equipment, roll turning lathes, and ingot mold milling equipment.

The jobbing nature of this foundry's operations requires that it be, in addition to an ingot mold foundry, a steel foundry one week, an iron foundry the next, and perhaps a roll foundry the following week. This gave rise to the requirement that, in addition to the charging of the cupola, the arc furnace and air furnace would need to be charged at various times both with cold charges and with hot charges for duplexing.

The foundry has been designed for ready expansion to provide an additional 150 per cent capacity. Construction of the foundry is expected to be completed in about nine months, about the time when the main portion of the steel mill will be completed.

Reprinted from STEEL Magazine



Louis & Southwestern Railroad Co., to Virginia Bridge Co., Roanoke, Va.

173 Tons, Gulf County, Fla., lift bridge, Cleary Brothers Construction Co., to Virginia Bridge Co., Roanoke, Va.

155 Tons, Forest Park, Ill., buildings, Mississippi Valley Steamship Co., to American Bridge Co., Pittsburgh.

140 Tons, Rockwood, Mich., conveyor system, crusher building, etc., for Michigan Silica Co., to Whitehead & Kales Co., Detroit, through H. E. Rudy Co., Detroit.

112 Tons, Trenton, Mich., new Monsanto Chemical Co. building, to Whitehead & Kales Co., through Esslinger-Misch Co., Detroit.

Fabricated steel inquiries this week were as follows:

4000 Tons, Marysville, Calif., State Highway Commission, Feather River crossing.

3950 Tons, New York, Battery tunnel shaft, New York City Tunnel Authority.

3522 Tons, Atlanta, Ga., baking plant extension, National Biscuit Co.

2600 Tons, Niagra, Wis., Kimberly-Clark Corp., manufacturing buildings.

1200 Tons, Pearl River, N. Y., warehouse, American Cyanimid Co.

1200 Tons, Washington, generating station, Potomac Electric Power Co.

1131 Tons, New Martinsville, W. Va., caustic and chlorine barges, Pittsburgh Plate Glass Co.

800 Tons, White Oak, Md., building, Naval ordnance plant, bids in Nov. 27.

730 Tons, Halifax County, N. C., Roanoke River bridge, General Contractors.

675 Tons, Various locations, Atchison, Topeka & Santa Fe railroad bridges, 1946.

600 Tons, Morton Grove, Ill., factory building, Baxter Laboratories, Inc.

570 Tons, Kankakee, Ill., Armstrong Cork Co. plant.

478 Tons, Pawtucket, R. I., grandstand, Burrillville Racing Assn.

450 Tons, Chicago, building, B. T. Babbitt Co.

450 Tons, Mason City, Iowa, highway undercrossing.

360 Tons, East Africa, car dumper, R. W. Kaltenback Corp.

350 Tons, Minneapolis, Minn., buildings, General Motors Corp.

300 Tons, Jerrett, Va., Johns Mansville & Sons warehouse.

266 Tons, Garden City, N. Y., department store addition, Frederick Loeser & Co.

250 Tons, Fitchburg, Mass., machine shop, etc., Magnus Metal Division National Lead Co.

250 Tons, Somerville, Mass., H. K. Porter, Inc., plant.

250 Tons, Kearny, N. J., building, Congoleum Nairn, Inc.

225 Tons, Schenectady, N. Y., buildings, General Electric Co.

220 Tons, Green Bay, Wis., fertiliser plant, Northwest Cooperative Mills.

180 Tons, Bridgeton, N. J., additions, Owens-Illinois Glass Co.

100 Tons, Boston, automatic unit, Reo Motor Car Co.

Reinforcing bar awards this week included the following:

400 Tons, Wilmington, Del., Ralston Purina building, through Jones-Hettelsater Co., St. Louis, to Buffalo Steel Co., Tonawanda, N. Y.

250 Tons, Detroit, addition to building, 77 at Timken-Detroit Axle Co., to Concrete Steel Fireproofing Co., Detroit, through Couse & Westphal.

Reinforcing bar inquiries this week included the following:

1300 Tons, Peoria, Ill., Hiram Walker distillery rack house.

450 Tons, White Oak, Md., ordnance laboratory, shop building, U. S. Navy.

450 Tons, Minneapolis, Dayton Stores building.

400 Tons, Trenton, N. J., L. A. Young

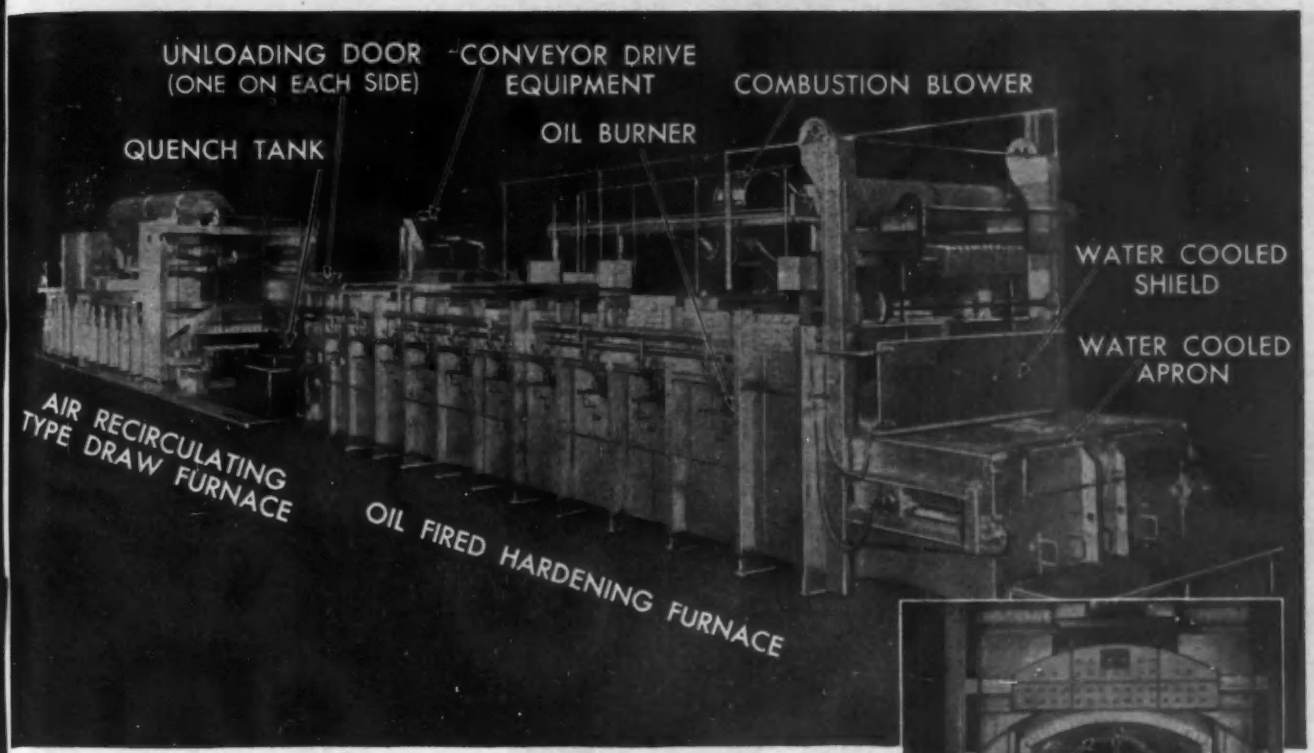
STEWART

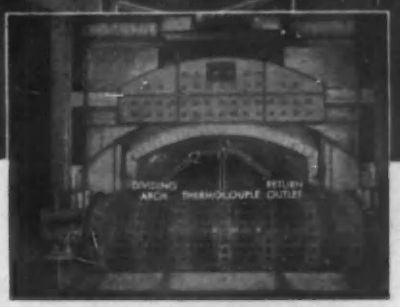
THE BEST INDUSTRIAL FURNACES MADE

No. 54 OF A SERIES of Typical Installations

For HEAT TREATING LEAF SPRINGS

at the Standard Steel Spring Company, New Castle, Pa.





Interior of Stewart Draw Furnace from the charging end showing the conveyor belt.

Discharge end of the Stewart Recirculating Draw Furnace showing Conveyor Belt drive through speed reducer and variable speed transmission.

The problem of getting uniformity in heat treating leaf springs is difficult, due to the size of the spring and the great variation in length of the leaves in a single spring. A considerable amount of the possible variation is avoided by running all the leaves of each spring through the heat treating process at the same time. However, only an unusually well designed and properly operated furnace can be depended upon to make a six-foot leaf uniform from end to end and to give a one-foot leaf the same physical qualities as a six-foot leaf. The furnace must maintain the temperature within very close, predetermined limits and provide absolutely uniform conditions throughout.

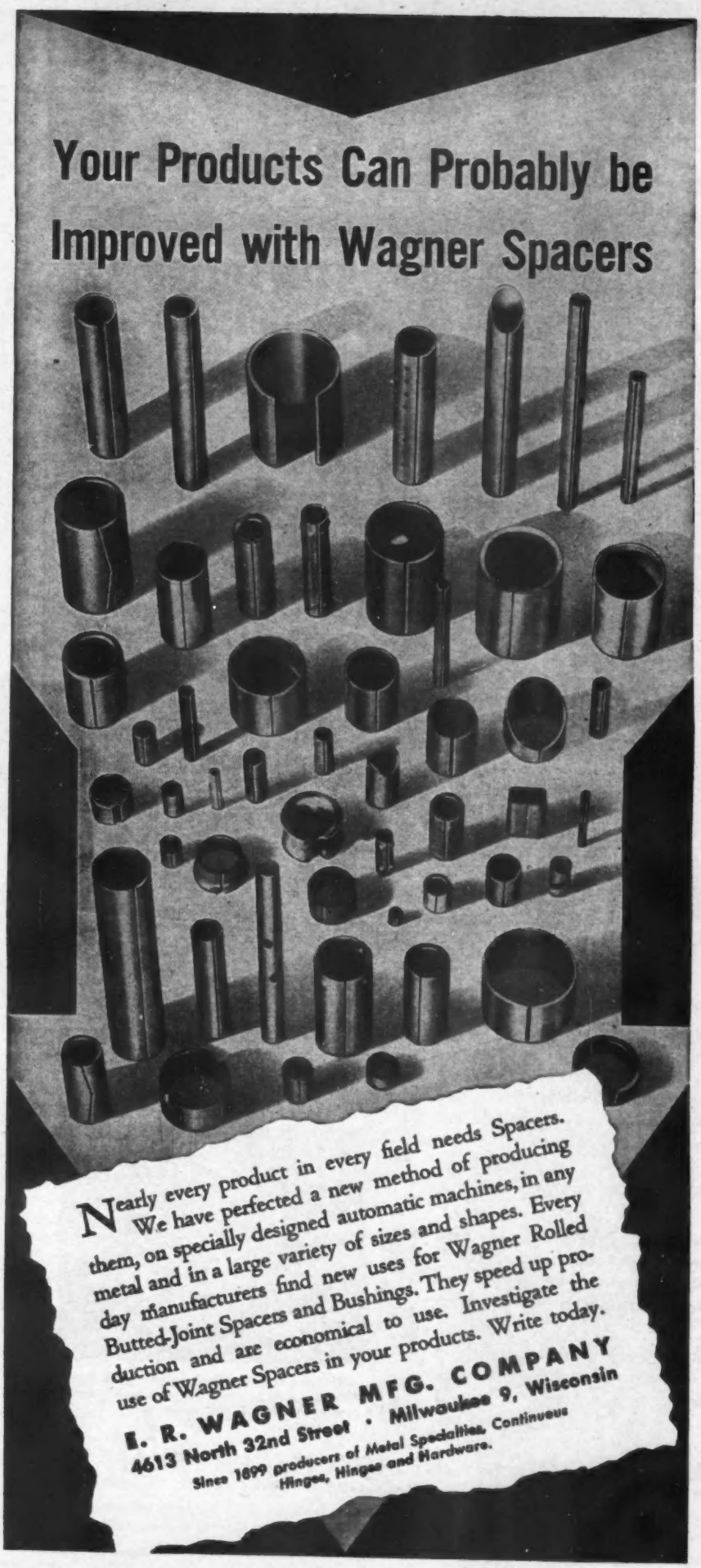
Standard Steel Spring Company, for many years prominent in the heat treating of metals, and a prior user of Stewart Furnaces, has recently added to its furnace equipment by purchasing Stewart Hardening and Draw Furnaces for two plants to meet its increased production schedules for leaf springs.

This installation is typical of the industrial furnaces Stewart engineers are building every day, both large types to meet the specified requirements of manufacturers all over the continent, and a complete line of standard types.

STEWART INDUSTRIAL FURNACE DIVISION of CHICAGO FLEXIBLE SHAFT CO.

Main Office: 5600 W. Roosevelt Road, Chicago 50, Ill. — *Canada Factory:* (FLEXIBLE SHAFT CO., LTD.) 321 Weston Rd., So., Toronto 9

A letter, wire or 'phone call will promptly bring you information and details on STEWART furnaces, either units for which plans are now ready or units especially designed to meet your needs. Or, if you prefer, a STEWART engineer will be glad to call and discuss your heat treating problems with you.


Your Products Can Probably be Improved with Wagner Spacers
Nearly every product in every field needs Spacers. We have perfected a new method of producing them, on specially designed automatic machines, in any metal and in a large variety of sizes and shapes. Every day manufacturers find new uses for Wagner Rolled Butted-Joint Spacers and Bushings. They speed up production and are economical to use. Investigate the use of Wagner Spacers in your products. Write today.
E. R. WAGNER MFG. COMPANY
4613 North 32nd Street · Milwaukee 9, Wisconsin
Since 1899 producers of Metal Specialties, Continuous Hinges, Hinges and Hardware.

Spring & Wire Plant.

300 Tons, Greenfield, Wis., Froedert Grain & Malting Co.

158 Tons, Wallingford, Conn., bridge over New Haven Railroad. M. A. Gamino Co., Providence, contractor.

116 Tons, Duluth, Minn., ramp garage.

100 Tons, Cedar Rapids, Ia., Cherry-Burrell Corp. building.

Factory Employment Expected to Increase Toward End of Year

Cleveland

• • • **Factory employment** in the Ohio-Michigan-Kentucky region totaling 2,165,000 is expected by Dec. 15, according to James K. Johnson, regional director of the United States Employment Service.

This would be an increase of 165,000 over the manufacturing employment of Oct. 15, but is still 500,000 lower than employment in July, 1945, and about 800,000 below the peak in November, 1943.

Basing his estimates upon reports from 1500 plants in the three states, Mr. Johnson pointed out that a large percentage of the employment rise will be due to increases in the automobile industry in Michigan. The downward trend in employment which followed VJ-Day has apparently been checked in Ohio and Michigan, he added, pointing out that there was a net increase of about 80,000 workers in manufacturing employment in those states from Sept. 15 to Oct. 15. Most of this increase occurred in Michigan and while employment in Kentucky decreased during this period, employment in that state will swing upward slightly by Dec. 15.

Unfilled job openings registered in the 160 local offices of the USES in the three-state region totaled 95,800 as of Nov. 1. This was a decline of about 8 pct from the Oct. 1 figure. In this connection, Mr. Johnson explained that employers today want a higher degree of skill and more experienced workers than they were willing to employ during the war years.

A large majority of the currently unemployed are women and older workers who were laid off as a result of cancellation of war contracts, whereas the demand today is for younger male workers, he said.

Mr. Johnson added that the increase in employment does not reflect a corresponding decrease in unemployment, since returning servicemen are adding large numbers monthly to the labor force.

Russian Steel

(CONTINUED FROM PAGE 107)

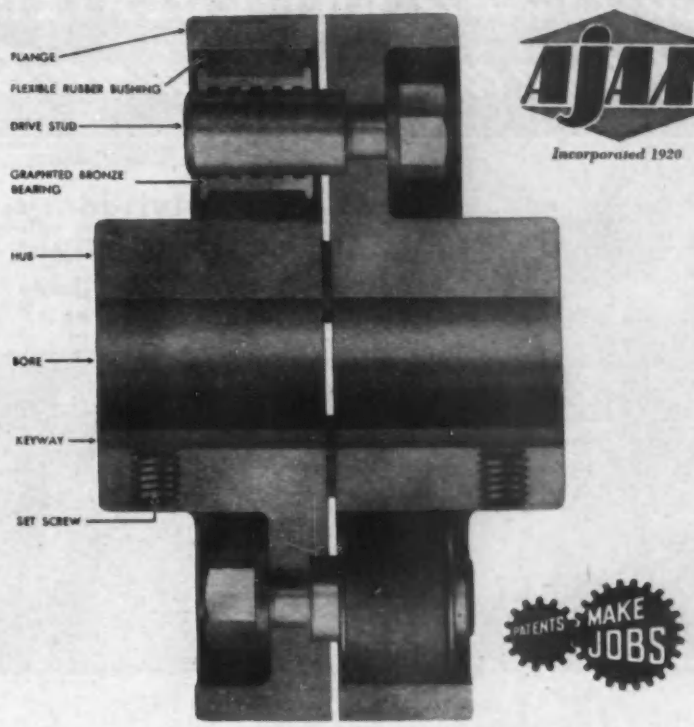
and their number increased. The same can be said of other equipment. The extent of the changes are demonstrated by an instance of one very important type of alloy steel which was smelted before the war by a duplex process and is now successfully smelted in one step in basic openhearth furnaces. Another type of alloy steel was smelted in electric furnaces before the war. At first it was necessary during wartime to transfer this production to acid openhearth furnaces. The next step was transfer to small basic openhearth furnaces. This type of alloy is now smelted in 185 ton basic openhearth furnaces and casting into large size ingots.

In rolling mills, the conversion to production of quality rolled steel necessitated increase in facilities for removing external faults from billets and rolled steel. For the rolling of alloy steels and new cross-sections of ordinary rolled steel it was necessary to adapt existing rolling mills and technical changes in production processes had to be worked out. Many shops had to be equipped with reheating ovens, means for gradually cooling alloy steel and for further cleaning of rolled steel.

The changes in the technique and organization of production required heightened qualifications for workers. A strengthening of labor discipline was required. Cadres of foremen for high quality steel production had to be trained.

The extent of changes which took place in production is illustrated by the fact that at one very large steel mill the production of quality rolled steel increased from 9.3 pct of the total rolled output in 1940 to 69.1 pct in 1943.

The construction of new plants for production of alloy steels, rolled steel, pipe, metal products, and fire brick in the East began in the first days of the war. New shops and factories were projected and constructed on the basis of the evacuation of equipment from the Ukraine and the central industrial area. Existing facilities in the East were widely used in connection with the construction of these new plants and shops. In many plants in the East new facilities were installed in plant areas not being used or being only partially used. In some cases non-essential production was abandoned and plant facilities converted for ferrous metallurgical pro-



The Inside Story of
AJAX FLEXIBLE COUPLINGS

Ajax Flexible Couplings protect direct connected machines from unavoidable misalignment. They require no lubrication. They are quiet running — no backlash, no noise. They provide free end-float which permits electric machinery to find its magnetic center. They operate satisfactorily in abrasive-laden air.

They are built in a wide range of sizes and capacities with standard couplings *made of forged steel or cast semi-steel.*

For special requirements flanges can be machined from aluminum, bronze or other metals, and can be plated with chrome, silver or cadmium for protection against adverse atmospheric conditions. Thousands of cadmium-plated Ajax Couplings are running on U. S. Navy equipment throughout the world.

Ajax Couplings can easily be made integral with brake drums, pulleys, fly wheels, etc.

Write for new catalog giving complete data.

AJAX FLEXIBLE COUPLING CO. INC.

WESTFIELD, N. Y.

New Baker ARTICULATED Fork Truck cuts aisle requirements

DESIGNED PRIMARILY FOR EFFICIENT WAREHOUSE OPERATION

A basically new design* involving a new method of steering by "articulating" the frame, permits swinging the load to line it up in position without lining up the truck itself. Thus this truck requires about two feet less space for placing loads at right angles to aisles. It needs less clearance on turns, and speeds carloading or any other handling operation where loads must be lined up or positioned in congested areas.

Specific advantages of this truck are:

1. Works in narrower aisles.
2. Turns in a smaller radius.
3. Spots loads quicker and easier.
4. Control units are more accessible.
5. Simpler Steering design cuts maintenance.
6. Permits mechanization of handling where hand trucks were necessary because of space limitations.

Field tests in both warehouse and production operation have proved the many advantages of this new truck. For complete specifications request Bulletin 1330.

*Licensed under Stevenson Patent No. 2,124,277.

BAKER INDUSTRIAL TRUCK DIVISION *of The Baker-Raulang Company*
2175 West 25th Street • Cleveland, Ohio
In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

duction. In other cases warehouse space of operating plants was used. Not only the warehouse buildings were used but also existing transport and other facilities. The use of evacuated equipment in new enterprises along with efficient organization of construction and installation of equipment permitted the commencement of such highly important production as rolling of armor plate, drawing of pipe, etc., within two or three months after the beginning of the war. At one of the largest eastern factories an evacuated armor plate mill was installed in a rolling mill and went into production with new reheating and thermic furnaces two months after the beginning of the war. At another factory an evacuated armor-plate mill was put into production in a warehouse (formerly used to store rolled steel) as early as October 1941. New types of pipe (for the manufacture of planes, tanks, and other military supplies) were put into production very quickly at eastern metallurgical plants. The output in the East of such essential parts for the aviation industry as springs and cable also was mastered at a very rapid rate. In many cases the output of evacuated equipment increased as compared with its pre-evacuation output.

The construction of new production units was extremely important in wartime because of the loss of the Ukraine. It was necessary to increase the rate of capital investment there and at the same time to speed up construction and economize on deficit construction materials. Resources were concentrated entirely on objects of prime importance.

Standard projects for openhearth and blast furnaces were reviewed. The new standard plans adopted economized metal, fire brick, and other materials. Construction was speeded up by pre-assembly of parts of units at the plant site. These parts would then be moved into place when complete. In this way not one but three or four parts of, say, a blast furnace could be worked on at the same time. Construction processes were mechanized and the flow of materials and parts was well organized. New openhearth and blast furnaces were installed for the most part at existing production centers. This permitted the use of already existing transportation and power facilities during the course of construction. The capacity of eastern metallurgy was increased during the war by the construction of such units as blast furnaces No. 5 and 6 at Magnitogorsk,

No. 3 at Novo-Tagil, and No. 1 at Chelyabinsk. In addition, small and medium sized furnaces were constructed or reconstructed at existing Ural plants such as Chusovo where furnace No. 2 was put into operation. The type of new openhearth furnaces constructed had a capacity of from 120 to 185 tons with complete mechanization of processes.

Electrometallurgy in the East was deficient before the war. Two new large Electrometallurgy factories were constructed during the war complete with rolling mills. A series of new electric furnaces were installed at one existing factory. Total capacity in the East for electric steel was increased by several times and war industry was secured in its supply of high quality structural steel, and special steels.

In the case of rolling mills, attention was concentrated on the construction of sheet mills for armor plate and other types of sheet. The capacity of Eastern metallurgy was increased many times and the needs of the tank industry were assured by these new mills.

Pipe production facilities were greatly increased. Two new pipe factories were built and new pipe shops were installed in existing factories. Rolling mill facilities for the production of pipe were increased 2½ times. An even greater increase was attained in capacity for production of cold-rolled and cold-drawn pipes. Eastern metallurgy can produce at the present time any existing type of pipe.

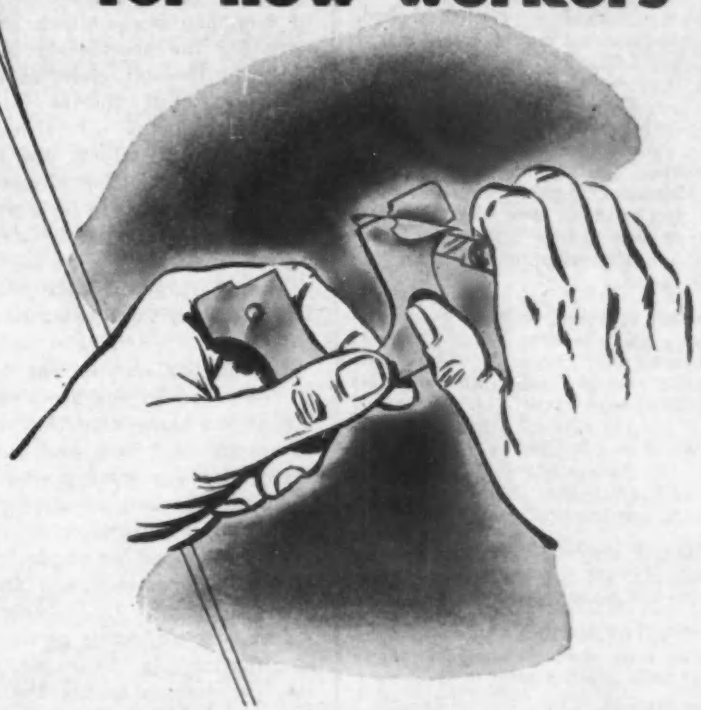
The production of metal products of various types was also greatly increased. Capacity of existing facilities was added to and four new factories were built. The production of certain individual articles increased several times.

Before the war, Soviet ferrous metallurgy was largely supplied with fire brick by plants in the Ukraine and central industrial area. As a result the fire brick industry in the East had to be built up during the war. The assortment of production had to be increased as well as the volume. The raw material base of clay and quartzite had to be widened. This problem was successfully solved. Production of "dinas" fire brick for coke batteries and types for pouring of steel had to be developed. Capacity for fire brick manufacture was increased for individual types from 20 to 80 pct. Likewise, the production of raw materials for fire brick manufacture.

The raw material basis for Soviet ferrous metallurgy was radically

QUICKER KNOW-HOW

for new workers



THE KNOWN precision gauge of laminations in the solidly bonded Laminum shim makes machining unnecessary in fitting machine parts. But consider this too . . . it assures accuracy by preventing errors (sometimes spoilage) due to inexperience. Want performance data?

Laminum shims are cut to your specifications. For maintenance. However, shim materials are sold through industrial distributors.

Laminated Shim Company, Incorporated
76 Union Street • Glenbrook, Conn.

LAMINUM

THE SOLID SHIM THAT peels FOR ADJUSTMENT

(Advertisement)

Railroads, Refineries, Electric Power Companies, Sheet Metal Workers Shipbuilders All Use

GALV-WELD PROCESS

(Patented)

The weld and adjacent damaged area, where the galvanizing burns away at the time of welding, are coated while welding, using the residual heat to flow on Galv-Weld Alloy, permanently insuring

100% PROTECTION AGAINST RUST AND CORROSION

Galv-Welding obsoletes riveted, bolted, soldered construction; lowers costs; makes for stronger, leakproof, vibrationless construction. It produces no fumes, requires no sand or grit blasting, flux, special equipment, set-up or clean up after application. The alloy, in bar form, is quickly applied in all positions and confined quarters. The coating eliminates painting expense: will not chip, peel or crack, even when the base metal is stressed beyond its elastic limit. Fractures in galvanizing, due to forming, are easily coated.

Government approved, with tests showing Galv-Weld equal to and/or better than hot dip galvanizing in corrosion resistance, not only passing standard salt spray requirements of 200 hours, about 8 days, but remaining in test 141 days. Galv-Welded joints have withstood over 8 years' exposure to salt air mists. The process is a must for underground storage tanks. All-welded steel buildings are now practical.

RAILROADS employ it in construction and repair of water tanks, signaling systems, towers and piping.

SHEET METAL WORKERS use it in air conditioning duct systems. It is also especially applicable in refrigerator units.

REFINERIES like it because it is not affected by the corrosive acid-bearing fumes.

ELECTRIC POWER COMPANIES are redesigning transmission towers to utilize welded rather than bolted type construction. It is used also in the repair of sub-station galvanizing and transformer cases.

SHIPBUILDERS are coating welded seams and joints in pipe, sheets, plates, ventilation ducts, deck houses, water and fuel tanks, sanitary drains, ammunition and ready-service boxes, gallery and baking equipment, sinks and washers, cold storage lockers, inner bottoms and hand rails.

You are invited without cost to submit products for producing examples of Galv-Welding. Further details and sample of Galv-Weld Alloy may be had by writing

GALV-WELD PRODUCTS
Dayton 10, Ohio

changed. The improved preparation of ore assumed particular importance. The mixture of ores and fluxes was radically improved. The enrichment and preparation of ore was improved by crushing, washing, magnetic separation and agglomeration. The output of prepared ores and agglomerate increased from one and one-half to two times. Several new factories for ore enrichment by means of agglomeration, crushing, and washing were constructed.

Production of iron ore had to be increased. Ore mines were constructed during the war with a capacity of several million tons. Geological explorations were carried out and in 1941 to 1942 alone, known resources of iron ore in the East were increased 27 pct.

Manganese production was also increased. This permitted the smelting of ferromanganese which was necessary for the deacidation of steel.

During the war, charcoal blast furnaces assumed special importance. In spite of the difficulties in the organization of supply and transport of wood, the smelting of charcoal pig iron in the Urals was increased 30 pct as compared with the last prewar years.

The shortage of coke was acute. It was met by the construction of new batteries.

During the war it was necessary not only to increase steel production but at the same time the proportion of special cast iron, and openhearth ferroalloys for steel production had to be raised. In other words, the production of steel had to be increased while the proportion of pig iron being diverted to castings and ferroalloys was increasing. Under this circumstance, use of scrap assumed great significance. In 1940 the ratio of steel production to pig iron production was 1.23 as compared with 0.93 in 1934. Further increase was required during the war. This was possible because of the fact that the development of metal working industries and the consequent changes in the demand structure for metal during the war led to an increase in the production of industrial scrap. The proportion of steel going to the metal working industries, which produce a large amount of scrap, increased, while cross-sections such as rails, beams, and sheet for construction purposes, which generates little scrap decreased. The increased production of quality steel led to an increase of industrial scrap both at metallurgical and metal working factories. Besides industrial scrap, non-industrial scrap was extensively used, particularly that secured from the battlefield. This required improved sorting and collection which was accomplished by mobilization of labor for this purpose. The proportion of steel scrap in the hearts of steel sections from Eastern factories increased 18 pct as compared with 1940.

During the war the production of ferroalloys had to be increased. The expenditure of ferrochrome per ton of steel increased 2.7 times. The expenditure of 75 pct ferrosilicon per ton of steel increased 2.2 times. The important productive facilities at Zaporozhstal were lost to Soviet metallurgy. It was necessary to organize the production of ferrochrome in openhearth furnaces. In addition, the productivity of electric furnaces was increased one and one-half to two times by improved technology. Two new ferroalloy plants were constructed. The production of certain types of ferroalloys in the East increased several times during the war. For the USSR as a whole during wartime ferroalloy production was increased above prewar levels. The demands of Soviet armament industry were met.

The expansion of Eastern metallurgy required increased electrical capacity. Electric stations were constructed and older stations were expanded in order to meet these needs.

At the present time, the reconstruction of Ukrainian metallurgy is a foremost problem. The Germans turned southern factories over to private firms which were incapable of putting them into operation. Meanwhile, they occupied themselves with the theft of raw materials, metal, and equipment. On their retreat, they wrecked most factories. The problems of reconstruction of Soviet ferrous metallurgy will be solved as were its wartime problems under the leadership of the great party of Lenin and Stalin.

To Construct New Plant

Pittsburgh

• • • **The American Brake Shoe & Foundry Co., New York, has announced an expansion to take place in the Pittsburgh area. Construction has already begun on a new $2 million plant near Washington, Pa., which will supersede the two plants now located in Pittsburgh. The company has purchased 47 acres to accommodate the facilities, the main building to cover an area of 600 by 125 ft.**

The foundry half of the new building is to be completely new.

Main Topic at AMTDA Meeting Is Disposal Of Surplus Machines

Cleveland

• • • **Surplus machine** tool disposal held the limelight at the 21 annual meeting of the American Machine Tool Distributors Assn., held here Nov. 19-20, with A. G. Bryant, president of Bryant Machine & Engineering Co., and vice-president of the Cleereman Machine Tool Co., sounding the keynote with his assertion that over 90 pct of the machine tools produced for war production are usable for the manufacture of peacetime products.

"With nearly 700,000 machines owned by the government out of a total in the country of 1,750,000, the distribution of surplus is daily becoming more oppressive to current machine tool sales," he asserted.

Pointing out that the rate for depreciation for these machines averages more than 20 yr, so that there is little likelihood that any considerable quantity of them will go out of service during the next decade, Mr. Bryant outlined for representatives at the two-day conclave seven proposed recommendations that would, in his opinion, help to revitalize the machine tool industry.

1. Let the President and the Congress order the setting aside immediately of one-half of government-owned machine tools, in all of their classifications, as a military reserve subject to review within two years for disposition at that time in the light of international conditions.

2. Let the State and Commerce Depts. immediately facilitate and expedite channels for export machine tool trade, permitting free and private commercial relations so that the industry may compete for the markets now being absorbed by England and other commercially-minded nations.

3. Let OPA immediately suspend price control as applied to the machine tool industry in view of the industry's highly competitive status and because more new machine tools sold will lower the cost of goods and counteract inflation.

4. Let Congress initiate a provision making possible a carry-back of losses of machine tool companies in 1946 and subsequent years as a credit against renegotiation refunds which were paid to the government during the war, and which weakened companies whose normal postwar business was absorbed by war requirements.

5. Let the Surplus Property Administrator and the RFC initiate at once the proposed plan for the participation of machine tool builders and distributors in the sale of surplus through the instrument of a properly established commission arrangement and let the administrator and the RFC establish immediately an advisory committee composed of machine tool builders, machine tool distributors and used machinery dealers for regular counsel with regard to its policies in the disposal of machine tools.

6. Let the industry itself with every constructive resource at its command proceed with the education of the general public in the economics of machine tools, their importance in creating employment and in increasing the standard of living and in maintaining our national defense.

7. Let the machine tool industry rededicate itself to the manufacture of even finer machines and to the introduction of these machines where they will do so much in the upbuilding of our country's future and influence, and

New Officers

Cleveland

• • • **New members of the executive committee of the AMTDA elected Nov. 20 are: H. A. Perry, Perry Machinery Co., Dallas, Tex.; Howard G. Mook, Vandyck Churchill Co., New York; A. R. Williams, A. R. Williams Machinery Co., Ltd., Toronto, Canada; and O. S. Hunt, Marshall & Huschart Machinery Co., Chicago.**

Officers re-elected were: A. B. Einig, Motch & Merryweather Machinery Co., Cleveland, president; George Habicht, Jr., Marshall & Huschart Machinery Co., Chicago, vice-president; D. N. Macconel, Machinery Sales Co., Los Angeles, second vice-president and C. C. Brogan, W. E. Shipley Machinery Co., Philadelphia, secretary-treasurer.

Other members of the executive committee, which includes the president, vice-presidents, secretary-treasurer and past presidents, are: Albert M. Stedfast, Stedfast & Roulston, Inc., Boston; O. W. Johaning, Colcord-Wright Machinery & Supply Co., St. Louis; Robert S. Page, The Henry Walke Co., Norfolk, Va.; John E. Livingstone, John E. Livingstone Co., Detroit; Joseph F. Owens, J. F. Owens Machinery Co., Syracuse and Bert L. Sylar, Bert L. Sylar & Son, Chattanooga, Tenn.

VOLZ
DROP FORGED
Clamp
(a Merrill Product)

A Brute
for Holding
Tenacity

The Positive Lifting (Flat Surface) Clamp.

Has a terrific grip as well as a wedge hold. (The 2 in 1 Clamp.)

Has a 5 to 1 factor of safety.

Will lift anything with a flat surface upon which the jaws can grip.

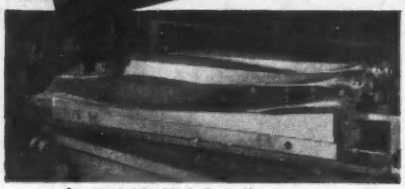
MB MERRILL Brothers

(Under same family management since 1866)

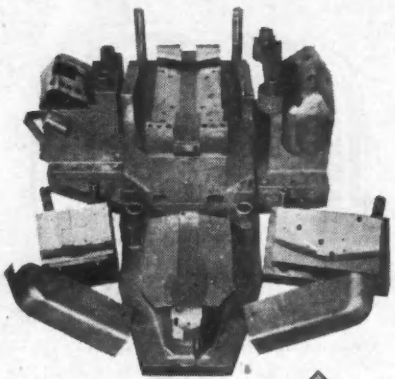
56-71 Arnold Avenue
Maspeth, N. Y.

It's the Clamp that appeals to those interested in Safety. Write for our "Green Bulletin" F-16.

MAKE US PROVE
Strenes METAL
WILL SPEED UP
YOUR TOOLING PROGRAM



Variable Pitch Propellers



Radiator Grill Top

Send us just one set of drawings and we will cast your die set on the following terms—satisfaction or no invoice. We've done it before. We're willing to do it again.

Also write almost any of our prominent automotive, tractor, farm implement, refrigerator or stove manufacturers. They can and will confirm our claims that Strenes cast-to-shape drawing and forming dies will:

Save time on machining and reach your presses sooner.

Stay in service longer between redressings and out-last dies of ordinary metal.

ASK FOR NAMES OF USERS
Don't fail to have us cast a trial die set.

THE ADVANCE FOUNDRY CO.
100 Seminary Ave.
DAYTON 3, OHIO
Sole Producer.
No licensee foundries.

STRENES METAL
DRAWING AND FORMING DIE METAL

set a new standard of commercial practice as well as of engineering.

Other speakers included: R. L. Giebel, Giebel, Inc., who reported activities of the committee on surplus property (see machine tool market developments); George R. Ray, Marshall & Huschart Machinery Co., Chicago, who spoke on "Advertising Material Used by Members"; Lt. Col. E. R. Motch, Jr., Motch & Merryweather Machinery Co., Cleveland; Tell Berna, general manager of the National Machine Tool Builders' Assn., whose subject was "The Machine Tool Industry from the Manufacturers' Viewpoint."

Westinghouse to Make Electric Heaters For Domestic Consumption

Pittsburgh

• • • Entry of Westinghouse Electric Corp. into the fields of electric heating for homes, an entirely new activity for the company nationally, has been announced by H. F. Boe, vice-president in charge of the district manufacturing and repair department of the company. Manufacturing headquarters will be located at Emeryville, Calif.

Under terms of a license granted by the Wesix Electric Heater Co., San Francisco, Westinghouse has acquired the right to use the basic principles involved in the design, construction and control of unit type electric heaters, according to a joint announcement made by Mr. Boe and W. Wesley Hicks, president of the Wesix organization.

Volume production of a complete line of newly styled models is expected to get underway soon in the Westinghouse plant at Emeryville. Stuart L. Forsyth, formerly of Pittsburgh, will head the new activity as sales manager for the company's new Home Heating Section.

Models comprising the new line will range from an easily portable 1250-w, 110-v floor unit to four kw, 220-v floor and wall models. All of the 220-v units will have built-in automatic thermostatic control. The heaters will be marketed through already established and widespread Westinghouse distributor and dealer channels.

"We expect our major markets will be California, Washington and Oregon," Mr. Forsyth reported. "In these areas, ample power is available at low cost, making electric heating for homes economically feasible."

The company's decision to enter the new field was made only after a detailed study of all methods of electric home heating. Under the direction of Mr. Forsyth, this investigation centered largely in sections of the country where electric heating appeared economically sound and desirable from the standpoints of both the ultimate users and the electric utilities, and where moderate year-around temperatures prevail.

"Thousands of installations already in existence have demonstrated its economy and desirability," he said. "Electric heat is entirely free of dirt, produces no smoke, fumes or ashes, does not remove oxygen from the air and is subject to simple, immediate control. It is safe, quick and sure.

"Although there are many ways of using electricity for home heating, and research and development work may result in more, we believe that unit heaters offer maximum benefits in the home in many ways. They can be used for auxiliary heating anywhere or for heating entirely by electricity where winters are mild. Desired room temperatures can be maintained automatically by means of built-in thermostatic control."

Normally, a unit heater will be used in each room of a home, but in some climates or at certain periods of the year when temperatures are only mildly cool, one unit will comfortably heat two rooms.

In operation, the unit heater first provides immediate heat by the radiation of infra-red rays, then maintains the desired room temperature by convection—the process which utilizes the normal tendency of cold air to descend and warm air to ascend to form a constant circulation through a heater. Cold air enters at the bottom of the heater and flows upward over both the outside and inside of vertical, cylindrical heating elements consisting of nickel-chromium wire supported on the outside of hollow ceramic posts. Air circulation is augmented by the scientific design of the unit proper and its heating elements.

Styled of durable metal, the new units will blend with any decorative treatment and can be used in any room. All models will be completely approved by the Underwriters Laboratories, Inc.

Sees *Need for Better Approach to Conserve Mineral Resources*

New York

• • • Director W. E. Wrather of the U. S. Geological Survey, Dept. of the Interior, yesterday told the National Foreign Trade Convention here that a more realistic approach must be taken toward conservation of our valuable mineral assets.

He said, "On the basis of present knowledge of our mineral resources, there is reason for pessimism as to our supplies of some of the supposedly common metals. Their production during recent years has not been balanced by comparable discoveries of new reserves. Our current situation seems to indicate a trend toward imminent national shortages. This is accentuated by the fact that abnormal war demands required full attention to production and only minor attention to the proving up of new reserves—at least in the case of the metals. It should be borne in mind that under acceptable mining practice properties are never completely explored in advance of development. Excess exploration is expensive and ties up an undue amount of capital. Therefore the developed reserves at a particular date seldom properly indicate the potentialities of a mine or a district.

"As a result of the war, proved reserves are indeed dangerously low, and unless the deficiencies are overcome by immediate and successful explorations on a grand scale, it is reasonable to predict that we will have to depend more and more upon foreign sources of supply.

"It is evident that the cream has largely been skimmed off our richest and most advantageously located mineral deposits. Each year it becomes more difficult and more expensive to find and appraise new reserves; and the quality of the reserves that have been discovered and outlined in recent years shows a trend toward lower grades.

"We are comparatively well informed concerning our coal reserves. The geology of coal beds is relatively simple, which enables us to make a reasonably accurate appraisal of our coal resources. In the eastern states, and in Illinois and Kentucky, the reserves of anthracite and bituminous coking coals have been seriously depleted; but even in these states the reserves of other coals available and suitable for heat and power needs are enormous. Considering the country as

HAVE YOU RECEIVED YOUR COPY OF THIS FACT-FILLED FOLDER?

King Fifth Wheel Company
2917 North Second Street
Philadelphia 33, Pa.

Gentlemen:

Please rush me my copy of folder on King Rings and Flanges. And with the build-up you've given it—it had better be good!

Firm Name.....

Address.....

City..... Zone..... State.....

My name and position is.....

STEARNS PIONEERED THE COOL MAGNETIC PULLEY

Today's accepted principle of forced ventilation in magnetic pulleys has always been a feature of STEARNS design and construction.

NOW—still greater cooling is provided by STEARNS better engineering through increased heat radiation area in a ribbed design which allows for deeper coils with more ampere turns and consequent greater magnetic pull.

A rugged magnetic pulley with power, economy and trouble-free operation at maximum peak loads. In sizes to fit your conveying system or in complete separator units. Bulletin 302.

STEARNS Lifting magnets, circular, rectangular and other shapes and all sizes. Our Bulletin 35. Also Suspended Separation Magnets. Bulletin 25.

Stearns MAGNETIC MFG. CO.

635 S. 28th St. Milwaukee 4, Wis.

a whole, we can safely say that from the standpoint of quality, quantity, and geographic distribution, the United States is more greatly blessed with coal supplies than any similar area anywhere in the world. We will have plenty of coal hundreds of years from now.

"Labor and equipment costs of mining are rising steadily, and we must conclude that the costs of extraction will very likely have the effect of progressively narrowing the industrial utility of various minerals although extensive low-grade deposits might appear to be adequate for our long-range needs. Low-grade foreign ores can be concentrated and delivered to the United States at prices that will be competitive in many cases with domestic products. From the standpoint of foreign trade and world stability this may represent a healthy development. It will certainly be a challenge and a stimulant to American technologic ingenuity.

"Most of our high-grade iron ore reserve lies in the Lake Superior district. In that locality the ore that can now be mined at a profit must have a metallic iron content of nearly 50 pct. Lower grades will scarcely bear the transportation costs to present smelting centers. Ore containing as much as 68 pct of iron was produced in the area in its early development; but the deposits now being worked have an average grade of approximately 52 pct. Of the original 3 billion tons of commercial grade ore, nearly half has been mined. Probably within another 10 yr or so the quality advantage that these ores have enjoyed in the domestic market will have been largely canceled out.

"When that time comes the Lake Superior district will still possess the greatest reserve of iron ore in this country, but it will comprise lower grades of ore that cannot be worked at a profit by present methods or at present prices. Since that region has been supplying about 85 pct of our needs, we will then either have to improve the methods of mining, treating, and transporting iron ore—or else import enough iron to sustain our industrial economy with a probable further shift of the smelting industry from inland points to the Atlantic seaboard. Iron mining will undoubtedly become of more importance in a number of our states where smaller deposits are

CHILLED SHOT DIAMOND GRIT

Airless or centrifugal operating machines require Heat-Treated Shot or Heat-Treated Steel Grit.

The ordinary Shot and Grit will not do. They break down too fast and wear away quickly. In other words—expensive at any price.

Our Shot and Grit were made expressly for use in airless machines.

It simply means—
More cleaning at much less cost.
More cleaning and less dust at less cost.

And, remember—any old size won't do.

There is a correct size of Shot and Grit to obtain maximum results.

If cleaning grey iron, malleable iron, or steel drop forgings, we can save you money.

Let us prove it!

HARRISON ABRASIVE CORPORATION
Manchester, New Hampshire

known and will be accompanied by an increase in iron ore imports.

"We will probably never run out of iron ore in this country; but the cost of producing iron will increase with the years, as lower grade and widely scattered small deposits become our chief reliance. Price differentials between domestic and foreign iron will no doubt tend to equalize, and imports will therefore increase. Tariffs or international agreements are important factors in such situations but they obviously lie outside of the scope of this paper.

"Next to iron our most important metal commodity is probably copper. Because of the tremendous wartime demand for copper much of our known reserve has been severely depleted. At the prewar production rate of approximately 800,000 tons per year, and at the prevailing price of 12¢ per lb, our copper mines can be operated profitably for about 13 years on present proved reserves. No allowance is here made for inferred ore which will ultimately swell the total. This does not mean that our copper reserves will be exhausted in 13 yr. It does mean, however, that the rate of copper production will fall off sharply unless exploration results in the discovery of additional ore. The alternatives to successful exploration and improvement in techniques are high priced copper and increased dependency upon foreign supplies. The outlook for maintaining our present status of reasonable self-sufficiency in copper is good, but it is by no means a certainty.

"The situation with regard to lead and zinc in this country is similar to that of copper. Our known reserves of lead are sufficient only to maintain a normal 4-year supply of recoverable metal at present prices. By inference, based upon geologic knowledge, we can assume that exploratory drilling and extension of mine workings in present producing districts will probably prove up additional reserves to guarantee an 8-year supply. We can therefore estimate that we possess a total known, indicated and inferred lead supply equal to a 12-year demand.

"For zinc, the outlook is somewhat more encouraging, at least as far as the immediate future is concerned. Our inventory shows a probable 10-year supply remaining to be mined, and the possibility of proving up as much more.

"For the past 20 years the United States has imported more aluminum ore than has been domestically produced. Expanded war needs, and the curtailment of imports caused the federal government to pursue a comprehensive program of exploration in this country of all grades of alumina-bearing material that might be utilized through existing or proposed techniques. In addition, intensive experimental work was carried on to devise processes that would extract alumina satisfactorily from the more impure grades of bauxite ore, high-alumina clays and certain crystalline minerals that contain this light element. As a result, our aluminum plants were able to process during the war some raw materials that were considerably below the standards that were regarded as minimum prewar.

"It is estimated that we have approximately an 8-yr supply of bauxite ore of prewar acceptable grades. However, wartime research and plant production experience has demonstrated that we can now consider as recoverable reserves the very generous supply of lower grade bauxites of Arkansas, Georgia, and the Gulf Coastal area. By lowering the ore standard still further, as will doubtless be done, and by including high-alumina clays, our reserves can be further increased.

"Magnesium is even more plentiful. Reserves available in magnesium limestone and natural brines are enormous; and obviously we can never exhaust the source of this metal within the waters of the seas.

"The so-called strategic minerals are defined as those considered to be essential to national defense, for supplies of which we must depend chiefly on sources outside the United States. Included in this group are antimony, chromium, manganese, nickel, mercury, tin, tungsten, and others.

"Throughout the war period the Geological Survey and the Bureau of Mines jointly carried out an intensive program of exploration of known and prospective deposits of the ores of these minerals. By virtue of the information thus secured, and through generous subsidies to prospectors and mine operators, our output of these materials was increased to nearly meet wartime needs. Many strategic mineral industries that flourished during the war will probably be forced to close down when world market conditions again become stabilized. Without the support of artificial price structures our strategic minerals are likely to continue to be strategic, in spite of the fact that our reserves are now known to be considerably larger than was thought to be the case before the war. We will no doubt continue to import in large quantities.

New Book TELLS HOW You Can Make Important Savings in Airblasting Costs

A blast nozzle is relatively *cheap* as far as original cost is concerned, but it can be very *expensive* if it is subject to rapid wear. A nozzle is like a valve. If the orifice enlarges quickly there will be a terrific waste of costly compressed air. For example, a nozzle with 3/8" bore costs 47.3c an hour for air at 80 lbs. pressure. Enlarged to 1/2" this cost jumps to 84.2c . . . a difference of 36.9c per hour! If you want suggestions on how to make important savings in airblasting, get the book illustrated above today. It is free. Ask for Catalog No. 27.

American
FOUNDRY EQUIPMENT CO.

510 S. Byrkit St., Mishawaka, Indiana

New
OAKITE
CrysCoat Process
Assures
LONGER
DIE LIFE
In Wire Drawing

A new development now successfully used in many mills, the Oakite CrysCoat Process, produces a phosphate coating on ferrous rods and wire that makes possible significant advantages and economies in wire drawing.

Improved Lubrication

Rods or wire immersed in the recommended solution of Oakite CrysCoat No. 86 acquire a non-hygroscopic, ductile, crystalline coating of fine grain structure. This coating combines CHEMICALLY with the metal surface and thereby imparts a tenacious covering that not only acts as an ADDED lubricant but, in addition, it has the ability to adsorb and retain regular lubricants.

Advantages Provided!

Among the PROVED advantages resulting from the use of Oakite CrysCoat No. 86 are increased production through less frequent changing or replacing of dies, longer die life, uniformly excellent wire appearance, shorter equipment downtime. Full details on this new Oakite technique may be had on request. Mill superintendents and other production executives are invited to send for their copy of a specially prepared service report. Write TODAY . . . there is no obligation.

OAKITE PRODUCTS, INC.
34E Thames St., NEW YORK 6, N. Y.
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE Specialized cleaning
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

Establish Pilot Plant To Study Concentration Milling and Processing

Milwaukee

• • • An extensive pilot plant for the study of milling and processing problems in basic industries has been placed in operation by Allis-Chalmers Mfg. Co. here.

Almost every kind of industrial basic raw material can be handled in the special test section designed to study specific problems of concentration, recovery and processing. Allis-Chalmers design engineers will be enabled to make recommendations for customers' flow sheets upon the basis of tests on materials sent in. Ores and minerals, portland cement, and flour and other food products, wood products, vegetables and seeds for oil extraction and other raw materials can be tested.

The heart of the minerals section is a flexible pilot mill four stories high which will handle samples of from 500 lb to 10 tons through crushing, grinding, concentrating and pyroprocessing. Later additions to the new laboratories, which have been under construction for the past two years, will include an experimental kiln 30 ft long. Simulating as closely as possible actual mill operation, the pilot plant consists mostly of machines of actual commercial design in small capacity size.

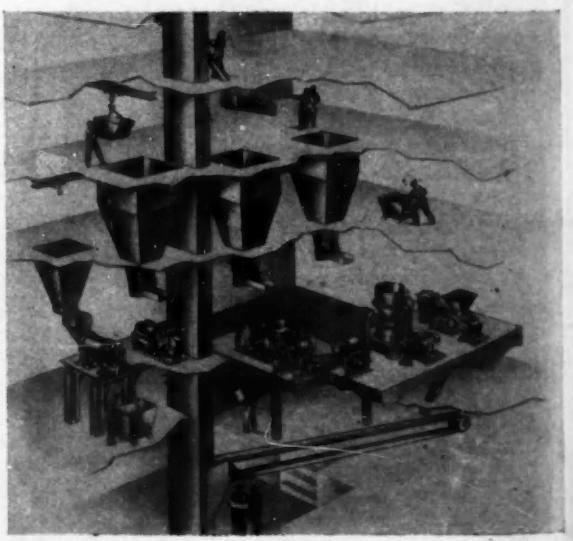
Where a flow of materials is not involved, batch testing facilities to handle samples of from 25 lb to 500 lb are available.

Crushing facilities include such special equipment as an Allis-Chalmers designed electronic device for varying roll speeds from even to a maximum ratio of 4-to-1, and power meters for providing complete capacity and power consumption data. Portable mills are mounted on rollers to run at variable speeds on the grinding platform, the flexible arrangement of ball, rod and blade mills permitting the introduction of slug mill tests, blade mill washings and many other modifications onto the grinding circuit.

Flowing to the concentration and extraction section, the material can be subjected to any of the important processes. The flotation circuit consists of 14 flotation cells, continuous single mineral or two mineral flotation involving two conditioning tanks arranged to receive thickening feed from a Dorr thickener. The first mineral section consists of one conditioner, three rougher cells and one cleaner cell; the second mineral flotation includes a conditioner and four rougher cells with two stages of cleaning.

Flotation tails are pumped to a dewatering cone, slurry tanks or a vacuum filter, or may be passed over a pilot table. Located on the ground floor, the 1400 gal and 600 gal capacity slurry tanks can be used for thickening with a siphon float, by overflow, or for agitation and transfer by an air lift. Pumped slurry can be continuously filtered on a Moore type vacuum unit arranged for two stages of washing if desired. Dry and wet magnetic separations are made on portable machines fed continuously from the pilot mill crushing and grinding machines, or from either of two hoppers. Operating as an integral part of the pilot mill circuit also is a sink-float machine for separating heavy media.

° ° °



ORE PILOT PLANT: *Ore samples up to 10 tons can be tested in the new Allis-Chalmers Mfg. Co. pilot mill at Milwaukee which includes crushing, grinding, and separation equipment. This cutaway drawing shows the flow sheet of the crushing and grinding section.*

° ° °